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Address

STUDIES OF SCHOOL AND HOSPITAL HYGIENE OF INTEREST TO THE OPHTHALMIC SURGEON.

CHAIRMAN'S ADDRESS BEFORE THE SECTION ON OPHTHALMOLOGY, AT THE FIFTY-SIXTH ANNUAL SESSION OF THE AMERICAN MEDICAL ASSOCIATION, PORTLAND, ORE., JULY 11-14, 1905.

CHRISTIAN R. HOLMES, M.D.

CINCINNATI.

It is, perhaps, unnecessary to remind the members of this Association of the amazing expansion of all human activities in this country in the past few years. The increase in population, the activities of the new centers of industry, and the awakening of the older and more settled parts of the country are little short of the marvellous. Hand in hand with industrial development and the pursuit of pleasure have gone the humanitarian and the scientific spirit, and we find that a very respectable proportion of our efforts of to-day are given to the building of new schools, colleges and hospitals. As a people we are slowly awakening to the importance of properly lighting, heating and ventilating these new buildings in accordance with scientific laws.

We no longer take old buildings and try to remodel them so as to make them resemble what a school, college or hospital should be, but every community that realizes the necessity for new institutions of this character is making an earnest effort to have them constructed on the latest and most approved principles and is installing in them new devices for making them convenient for the purposes for which they are built and comfortable and sanitary for the human beings who are to live or to work in them.

The object of and the justification for the modern refinement of specialization is to promote efficiency. Schools, colleges, hospitals and asylums are becoming specialized. It is obvious that for the highest efficiency in its own particular line each of this class of buildings must have its own peculiarities of construction and equipment. This subject is so varied and vast that in a brief paper like this I can do no more than merely call your attention to a few points of importance relating to light, heat and ventilation.

The sanitarian, of course, includes in his province a multitude of subjects, but we can consider that our greatest concern is with the three subjects just mentioned. The problem of the lighting of school houses is comparatively an easy matter. A law has been laid down that we all recognize as one that can not be broken without disaster to the children's eyes. It is well expressed by Dr. Risley in one clear-cut sentence: "It is the duty of the architect to secure in his plan all the window surface possible consistent with safety of construction."

Cohn places the proportion of this window surface to floor space at not less than thirty square inches of glass to each square foot of floor space, or about one to five: but the effort should always be made to exceed this proportion, and, indeed, we are told of one instance in which the proportion is one to one. Again, for obvious reasons, it is perfectly evident from what direction the light should fall on the desks of the pupils—they should face a blank wall of neutral tint, and abundant light should be admitted from the left or left and rear, so that the writing hand should cast no shadows on the writing surface. This is the law of the school house, and it is for us to express ourselves so unequivocally and so constantly that neither the architects nor school committees will dare to violate it.

We have to-day in the United States about 16,000,000 pupils in the various schools and colleges. It is unfortunately a well-known fact that a fairly large percentage of these begin to deteriorate physically soon after entering school life, and a certain proportion of these are brought to the notice of the oculist on account of a progressive myopia. Out of 30,095 children examined in the schools of Cleveland in 1899-1900, 20 per cent. were found to have defective sight, and in Indianapolis out of 25,696 pupils examined 8,166, or 32 per cent. were trying to do school work with defective vision. Of course, only a portion of these were myopes, and we never have attained, and probably never will attain, the unfavorable figures of the German schools, which, according to their own scientists, were largely due to the use of the old "black letter" type; but, while it is possible that prolonged use of the eyes in study even under favorable conditions of light and good hygienic surroundings would produce a certain amount of myopia in some subjects, yet there is not the slightest doubt but that poor light, improperly proportioned desks and seats, resulting in faulty positions of the pupil and lowered vitality because of impure air due to faulty ventilation, are the agents most responsible for the large percentage of the myopia that we find in America to-day.

I heartily agree with Dr. Risley in his proposal that our schools should introduce a modified curriculum adapted to the physical capabilities of those scholars whose eyes may be defective or who may otherwise be in feeble health. Their hours of eye and brain work should be cut down or so distributed through the day or interspersed with hours of exercise and recreation as not to become a strain that a weak eye or a weak body would feel as a burden. For this reason also competitive examinations for this class of pupils—if not for all classes—should be abolished, and the scholar should be graded by the efficiency of his daily work, and not by the results attained by excessive and prolonged work at annual or semi-annual intervals. Injury to the eyes and to the general health is, unfortunately, a not infrequent result of this "cramming for examination."

The lighting of hospitals, however, can not be governed by any one hard and fast rule. We can always stand safely on the decision that sunlight and brilliant, diffused daylight are curative agents of the first rank, demanding free admission through generous window space to the wards of a hospital, and general wards should be as well lighted as any school room, so that physicians and nurses shall at all times be able to see their patients even from a distance and to observe minutely the color and texture of the skin and the expression of the face and be able to read in all parts of the ward the labels on boxes and bottles and the scale of the thermometer. There often arises, on the other hand, the urgent necessity for the exclusion of all or part of the light. There should be provided for all medical, surgical and neurologic wards small wards or rooms which can be partially or totally darkened, for

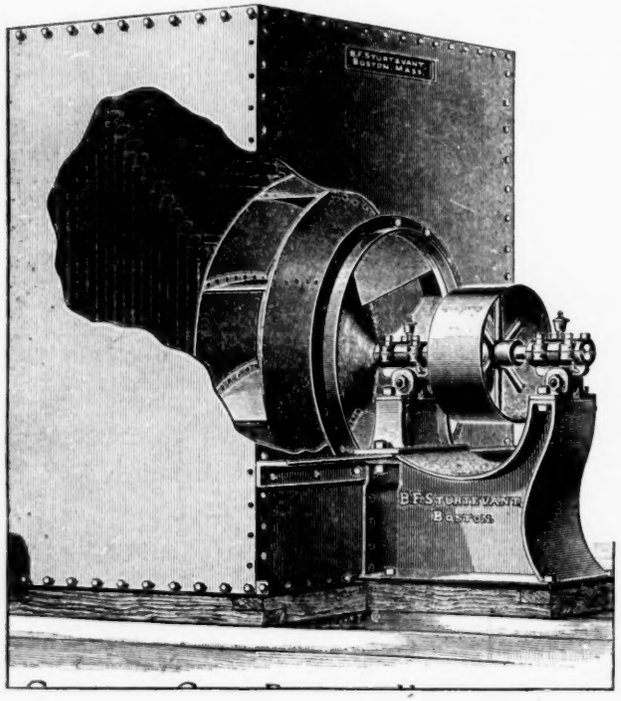

Figure 1.

light is a stimulus and conditions not infrequently arise, e. g., lead encephalopathy, traumatic meningitis and chorea major, in which all external stimuli must be reduced to the minimum. In ophthalmology, of course, this is of paramount importance. The eye is the terminal of one of the largest, most sensitive and most important nerves in the body, and its whole mechanism, nervous, vascular and muscular, responds with the greatest sensitiveness and delicacy to the stimulus of light. In almost all conditions of irritation or inflammation, therefore, we must be able to temper or banish the light at will.

In this connection it is necessary to consider the question of artificial light. This is not difficult as far as the operating room is concerned. In my own operating room, I have found it necessary to adopt the incandescent electric light as a permanent source of illumination. In the midst of a great manufacturing city where bituminous coal is universally used it is impossible to depend on the varying quality and quantity of daylight, so that, now being thoroughly familiar with the appearance and colors of tissues under the electric light, I exclude daylight altogether—even on bright days—and employ electricity exclusively.

A much more difficult problem than the admission of light is the induction of air into a building. To give you something of an idea of what an important question this is both from the standpoint of mechanical engineering and of administrative expense, let me rehearse to you a few figures from the calculations of one of our foremost experts on ventilation. After quoting the results of Pettenkofer's experiments on respiration, he says: "Able authorities are of the opinion that when the CO_2 is maintained at 2/10000 in excess of what is found in the outer air, that it (the ventilation) is at least good; in which case there will have to be admitted 3,000 cubic feet of fresh air per person per hour while in repose, 4,500 cubic feet for persons at gentle exercise, and 9,000 cubic feet for persons at hard work." This certainly seems to be a liberal standard to maintain, and the best authorities now seem to think it is ample in cold climates in winter, as the cost of ventilation must enter into the question, particularly when a great number of persons have to be provided for in comparatively restricted space, such as hospitals, schools, etc. It is customary in hospitals to provide for

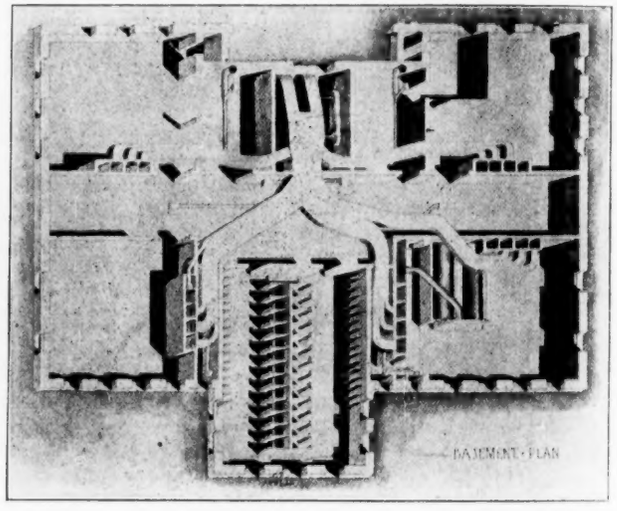

Figure 2.

a minimum admission of 3,000 cubic feet of air per bed per hour, with mechanical means of increasing the admission to 6,000 cubic feet of air per bed per hour when it is deemed necessary. This amount of air seems to cover the contingencies and insure a standard in which the excess CO_2 will be about 2/10000.

In passing, I would beg to remind you that the amount of carbonic acid present in the atmosphere may be readily ascertained to a sufficiently close degree for practical purposes in the following manner: Six clean, dry and well-stoppered bottles of a capacity, respectively, of 100, 200, 250, 300, 350 and 400 c.c., a glass tube containing exactly 15 c.c. to a given mark and a bottle of perfectly clear, fresh lime water constitute the apparatus required. The bottles should be filled by means of a hand ball syringe with the atmosphere to be examined. Add to the smallest bottle 15 c.c. of the lime water, put in the cork and shake well. If turbidity appears, the amount of CO_2 will be at least 16 parts in 10,000. If no turbidity appears treat the bottle of 200 c.c. in the same manner. Turbidity in this would indicate 12 parts in 10,000. In similar manner turbidity

in the 250 c.c. bottle indicates at least 10 parts in 10,000; in the 300 c.c., 8 parts; in the 350, 7 parts, and in the 400, less than 6 parts.

Taking this minimum of 3,000 cubic feet of fresh air per hour per bed and applying it to a 36-bed ward of a hospital we will find that we will need to pass through the ward 108,000 feet of air every hour and 2,592,000 every twenty-four hours. Now, as to the cost of this. The engineer quoted above says: "With coal at $5 a ton of 2,000 pounds (a fair average for the whole United States), it will require 20 cents per hour for fuel to maintain the warmth of every one million cubic feet of air passed through a building, taking one day with another throughout the winter. In the case of hospitals in which the heating is to be maintained day and night, say, through 180 days of a year, the fuel for the same time will be $864 for every 1,000,000 cubic feet of air passed in an hour throughout the season. This, of course, does not include interest on the plant, labor, service, etc., which increases it to about $2,000 per season per million cubic feet of fresh air passed into the building every hour. As the plant grows larger this can be reduced to probably $1,500 per year for each additional million cubic feet of air admitted per hour. This estimate will be considerably modified in the case of schools, as, of course, schools are not run continually. The fuel cost per hour, however, will remain about the same (20 cents for each million cubic feet of air passed through the building). An eight-room school will require about 1,000,000 cubic feet per hour during sessions, for all purposes, increasing at about the ratio of 100,000 cubic feet of air per room as the school building becomes larger.

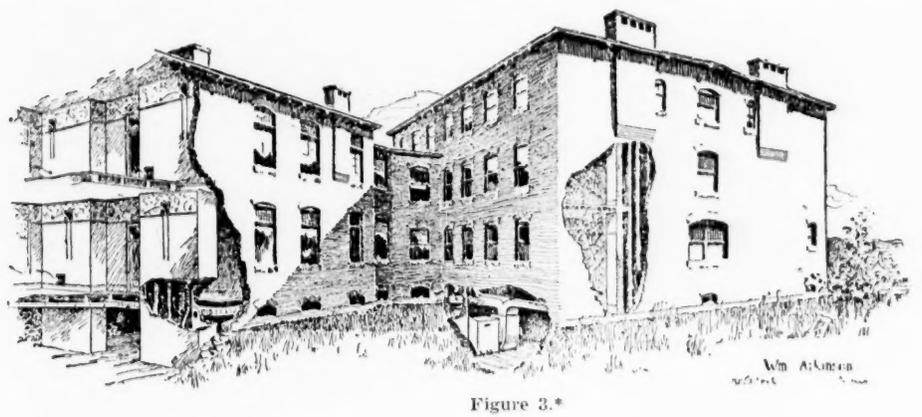

Figure 3.*

For the purpose of ready comparison of the hospital and school-house problem, I might say that the school room as now designed is about 24 by 32 feet and intended for the accommodation of from 40 to 50 pupils. You will see, therefore, that under what is known as the Massachusetts standard, which provides for the admission of 1,800 cubic feet of air per hour per child in the schools (without regard to weight), the amount of air necessary for admission to the average school room per hour should be about 100,000 feet. The Massachusetts standard was formerly much higher than this, but it was found that to make all the existing buildings comply with the proper standard would necessitate the practical reconstruction of every building devoted to school purposes in the state, so that the commonwealth had to make a compromise between its conscience and its pocket book, reduce its requirements and impose only such conditions as what is known as a "reasonable economy" would allow. As we build in the future let us be more generous both with money and air space.

It is hardly necessary to argue to this body of surgeons that generous ventilation of hospitals is necessary—in fact, indispensable—but such a striking illustration of this fact has lately come to my attention, confirming previous experiences of my own both in my own hospital and in the Municipal Hospital of Cincinnati, that I can not forbear to mention it to you. Dr. E. C. Rosenow[1] made an exhaustive and painstaking report on "Streptococci in Air of Hospital Operating Rooms and Wards During an Epidemic of Tonsillitis," and by microscopic examinations and culture experiments by the method of exposed plates demonstrated the existence of the same organisms in the tonsils of those attacked by the angina in the air of the wards and operating rooms and in the infected peritoneal cavities of women who had been subjected to laparotomy during the progress of the epidemic. Dr. Rosenow's paper is well worth the careful perusual of all of us who work in or have to do with the construction and management of hospitals. Broadly speaking, there are two principal methods of ventilation in use in hospitals and schools. One of these is the aspiration system, in which the vitiated air is sucked out of the building through vents which are warmed sufficiently to create a draught out of each room or ward through them, the aspirated air being replaced in the building by fresh air which is brought in through ducts and warmed or not by steam or hot water radiators, as may be required by the season.

The other system is that of the "blower" or "forced draught" system, which is divided into the "exhaust method," where a fan is employed to exhaust the air from the building, and the "plenum method," where a fan is employed to drive the air into the building. It will be observed that the principles of the "exhaust method" and of the "aspiration system" are the same, except that the means for aspirating the air from the building are in one case thermal and in the other mechanical.

We will, therefore, take up first a system that is now being installed in a very large number of our schools, libraries, churches, factories, and theaters throughout the country, observe with some minuteness its method, and then consider the theoretical and practical objections to its use. The name of the system, "plenum"—meaning full—implies that the air of the ventilated

* Fig. 3.—Waltham Hospital, showing shafts in the walls and heaters and vents in the wards. "The wing on the right in the illustration is divided into numerous small wards and nurses' rooms so that the method of distribution becomes similar to that provided for an office building or dwelling. Owing to the fact that the building is of so-called mill construction with no heavy internal partition walls, it was necessary to supply practically all of the fresh air and to remove the foul air through flues built into the exterior brick walls. The general arrangement of these flues on one end of the building is indicated. In the other wing are located two wards, one on either floor, and both of considerable size. These are heated from overhead outlets, as indicated. The air is forced toward the end of the room farthest from these outlets, being generally diffused in its passage and finally escaping through registers at floor level and nearly beneath the supply openings. In more complicated arrangements, and particularly in contagious wards, the system may be arranged to furnish practically every bed with an independent supply."

1. American Journal of Obstetrics, December, 1904.

building is to be kept somewhat under pressure—that the air is to be forced through. A large open window or air intake is left in the wall of the building, the fresh air enters here, is caught by the fan, which is the mechanical factor of the "draught" system, and is blown across a system of heaters and water pans (Fig. 1) and thence into a system of flues or heaters which carry this warmed and moistened air to the various rooms of the

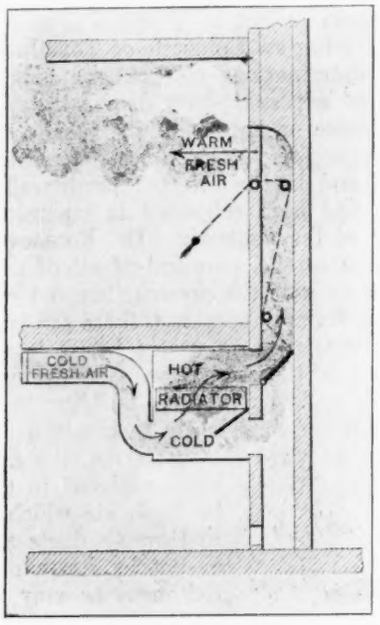

Figure 4.

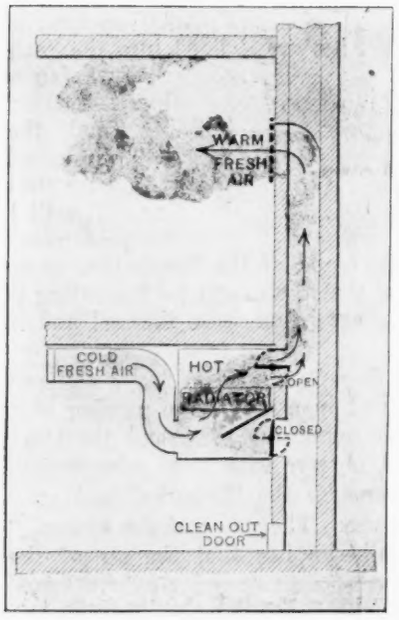

Figure 5.

building (Fig. 2), entering them through the openings in the walls about 8 feet above the floor. From thence it is taken, still under pressure (for the doors and windows are all kept shut), into vents or foul-air shafts which conduct the vitiated air from the room at the floor level (Fig. 3). This is the reason why this system is frequently known as the "down draught" system—because the air enters the rooms at a comparatively high level and leaves at a low level, the draught being, therefore, down.

The varying exposures of the rooms of a school or other building similarly occupied require that more heat shall be supplied to some than to others. With a constant and equal volume of air supply to each room, it is evident that its temperature must be directly proportional to the cooling influences within and around the room, and that no building of this character is properly heated and ventilated where the temperature can not be varied without affecting the air supply. To this end, air of a given temperature may be conducted to the base of each flue and there tempered to a degree suitable to the requirements of the room supplied. The air is heated to the maximum required to maintain the desired temperature in the most exposed rooms, while variety in temperature of air supplied to the other rooms is secured by mixing with the hot air a sufficient volume of cold air at the bases of the respective flues. Here is placed a mixing damper—so designed as to admit either a full volume of hot air, a full volume of cold air or to mix them in any desired proportion without affecting the resulting total volume delivered to the room—the damper should be operated by a thermostat in the room with which the flue connects.

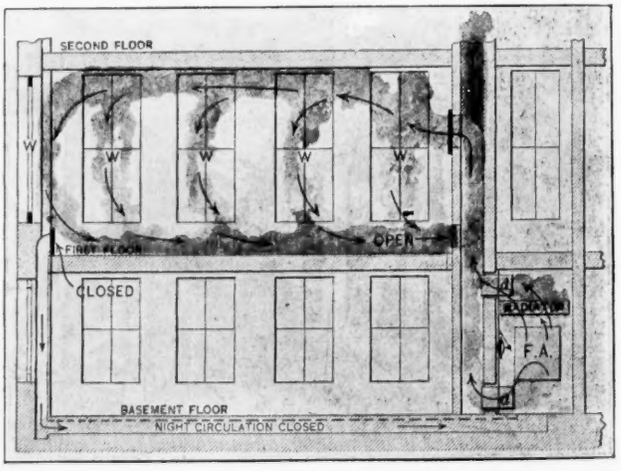

Figure 6.

Being familiar now with the mechanical arrangements of this system, you will readily comprehend the theory of its working. The warm air, as it leaves the register is supposed to rise to the ceiling, expand, and flow out under it, strike the windows on the sides of the room, cool and sink to the floor, and then, under the pressure of the incoming air to return along the floor to the outlet on the same side of the room as the register. In this estimate of the movement of the air, it is held that each child in the school room and each patient in the hospital ward is also a factor in setting up air currents which rise from about the warm body and from the warm lungs to the ceiling, spread to the walls with their contained windows, become cooled at the cool window panes, and sink to the floor to be withdrawn through the vents. One engineer who is evidently a warm advocate of this system says in discussing this point in connection with school rooms: "It may be said that the child is breathing the floor air which is passed to the ceiling over its body, and this is to a great extent true; but it is utterly impracticable to bring fresh air directly to the lungs of each child in a crowded room and therefore all that can be done is to secure a dilution or standard of purity which is reason-

ably good." (Figs. 7, 8 and 9.) It may be said in conclusion of this part of our subject that those who most favor this system say that the whole matter can not be better expressed than in the words of the late Robert Briggs of the American Society of Civil Engineers in an address on the superiority of forced ventilation:

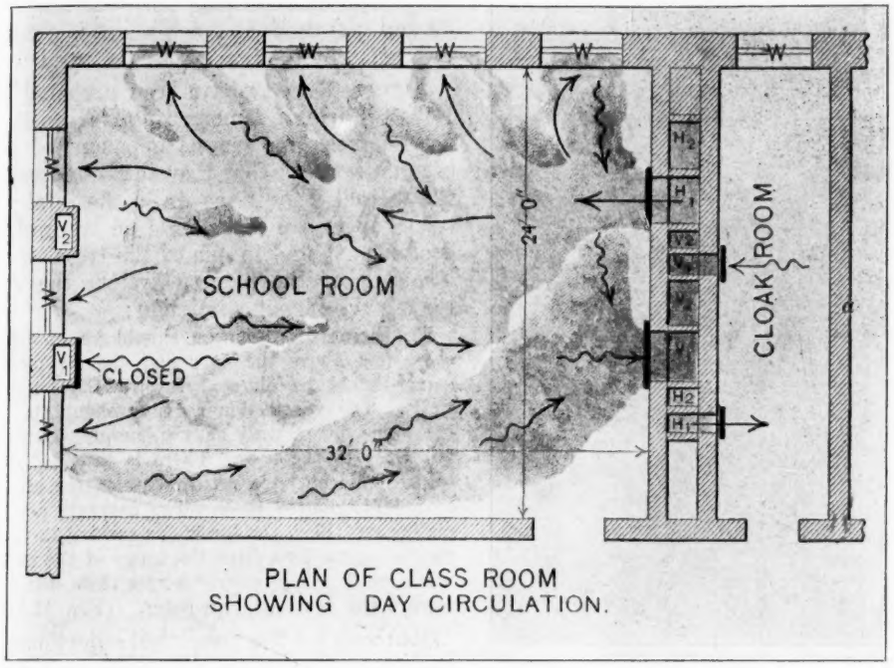

Figure 7.

This mooted question will be found to have been discussed, argued and combated on all sides in numerous publications, but the conclusion of all is that if air is wanted in any particular place, at any particular time, it must be put there, not allowed to go. Other methods will give results at certain times or seasons or under certain conditions. One method will work perfectly with certain differences of internal and external temperatures, while another method succeeds only when other differences exist. One method reaches to relative success whenever a wind can render a cowl efficient. Another method remains perfect as a system, if no malicious person opens a door or window. No other method than that of impelling air by direct means with a fan is equally independent of accidental natural conditions, equally efficient for a desired result or equally controllable to suit the demands of those who are ventilated.

Having now examined the plenum or down draught system, let us consider some of the theoretical objections to its use and endeavor, if we can, to see how it has worked in practice in the types of building that are the subject of our study.

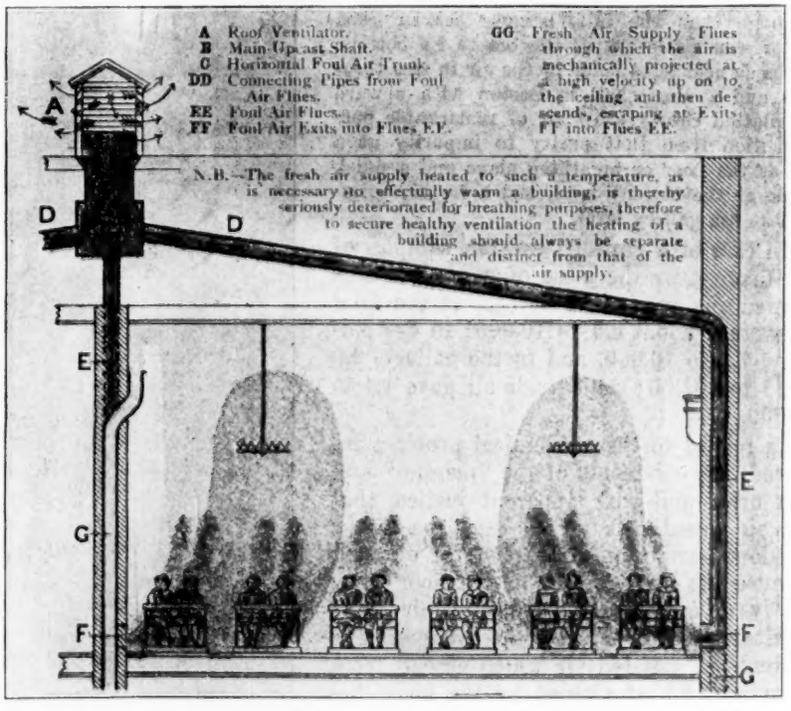
A Roof Ventilator.
B Main Upcast Shaft.
C Horizontal Foul Air Trunk.
DD Connecting Pipes from Foul Air Flues.
EE Foul Air Flues.
FF Foul Air Exits into Flues EE.
GG Fresh Air Supply Flues through which the air is mechanically projected at a high velocity up on to the ceiling and then descends, escaping at Exits FF into Flues EE.
N.B.—The fresh air supply heated to such a temperature, as is necessary to effectually warm a building, is thereby seriously deteriorated for breathing purposes, therefore to secure healthy ventilation the heating of a building should always be separate and distinct from that of the air supply.
A
D
D
E
E
G
F
F
G

Figure 8.

The most elaborate report that I have been able to find on the subject is that of the Woodbridge Commission on the ventilation of the Capitol at Washington. Among other things they say:

The relative merit of the upward versus the downward systems of ventilation may be estimated from the following considerations:

1. The direction of the currents of air from the human body is, under ordinary conditions, upward, owing to the heat of the body. This current is an assistance to upward and an obstacle to downward ventilation.

2. The heat from all gas flames used for lighting tends to assist upward ventilation, but elaborate arrangements must be made to prevent contamination of the air by the lights if the downward method be adopted.

3. In large rooms an enormous quantity of air must be introduced in the downward method if the occupants are to breathe pure fresh air, or about three times the amount which is found to give satisfactory results with the upward method. (Figs. 10 and 11.)

4. In halls arranged with galleries the difficulty of so arranging downward currents that, on the one hand, the air rendered impure in the galleries shall not contaminate that which is descending to supply that main floor below, and on the other hand, the supply for the floor shall not be drawn aside to the galleries, is so great that it is almost an impossibility to effect it.

Perfect ventilation can not be obtained, for this would only provide for the dilution of the impure air, while in perfect ventilation the impurities are not so diluted, but completely removed as fast as formed, so that no man can inspire any air which has shortly before been in his own lungs or in those of his neighbor. For these and other reasons the board thinks that the upward method should be preferred.

The argument that because carbonic acid gas is 52 per cent. heavier than air it is therefore desirable to ventilate by a downward current in a room, rather than an upward one can not be considered a valid one for the very apt reason that Woodbridge gives:

The carbonic acid gas yielded by respiration from the lungs and transpiration through the skin is as thoroughly diffused in the warm air currents rising from the body as is the same gas made by a candle or gas flame in the air currents ascending from those flames. That gas when once diffused in air can, because heavier than air, no more settle downward

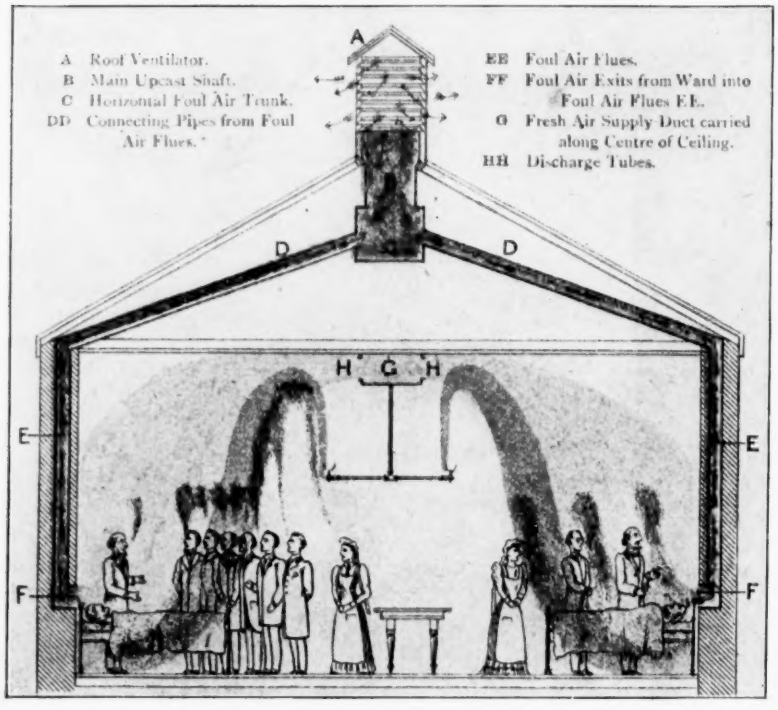

Figure 9.

out of the air and occupy the lower stratum of a room, than the salt, because heavier than water, can settle out of the sea to its bottom. Carbonic acid tests made of the air in two theaters and a music hall in Boston with upward ventilation clearly show air of remarkable purtransition from that purity to impurity at a ity at the floor or breathing plane and a quick plane at the balcony level, and a further vitiation at the gallery level.

In case of a crowded theater, samples of air taken near the close of a performance showed the proportion of CO_2 at the floor to average about 4.7 to 10,000; in the balcony, 7.8 to 10,000, and in the gallery, 9.9 to 11 to 10,000; the outside air gave 4.4 to 10,000.

In regard to the mechanical problem involved, the opponents of the "plenum" system urge, and with apparent justice, that the air quantity supplied must be larger for downward ventilation than for upward, because the air brought to the floor by a slowly descending movement of air must inevitably bring back on the breathers the currents of vitiated air which ascend from them. The heat yielded by the body, being nearly that given off by a burning candle, is sufficient to raise 30 cubic feet of air per minute through 10 per cent. temperature. The air in contact with the body or clothing or expelled from the lungs, made moist and warm by the body's heat and vapor, rises in a current which has a far more rapid rate of upward movement than any descending rate which can possibly be given to the mass of air ventilating a hall.

The air breathed by floor occupants must, therefore, necessarily be that of the ascending currents of vitiated air reversed by and diluted in the descending mass of air used in the downward movement. The inferior quality of air in downward ventilation can be made good only by considerably increasing the air supply, which is done, according to B. H. Smith, by supplying per hour between 30 and 200 times as much air as is actually inhaled by the inmates of the room.

Figures 8 to 12 have been prepared by Robert Boyle, a famous English ventilating engineer, an avowed opponent of the plenum system; that they fairly represent the actual conditions in a hospital or school room can be believed on theoretical grounds. I find in one of the treatises in advocacy of the plenum system the following significant admission:

The point of discharge should be at least eight feet above the floor and the air movement should be directed toward the outside walls. The ventilation register should be in the same inner wall as the supply opening, but close to the floor. There is thus induced toward this outlet a return flow of the air in a well distributed mass. The currents are in reality stratified, the lower one serving to take up the emanations from the lungs of the occupants as it sweeps slowly across them directly toward the ventilating register. (Fig. 12.)

So much for the theoretical objections to the "forced draught" or "down draught"

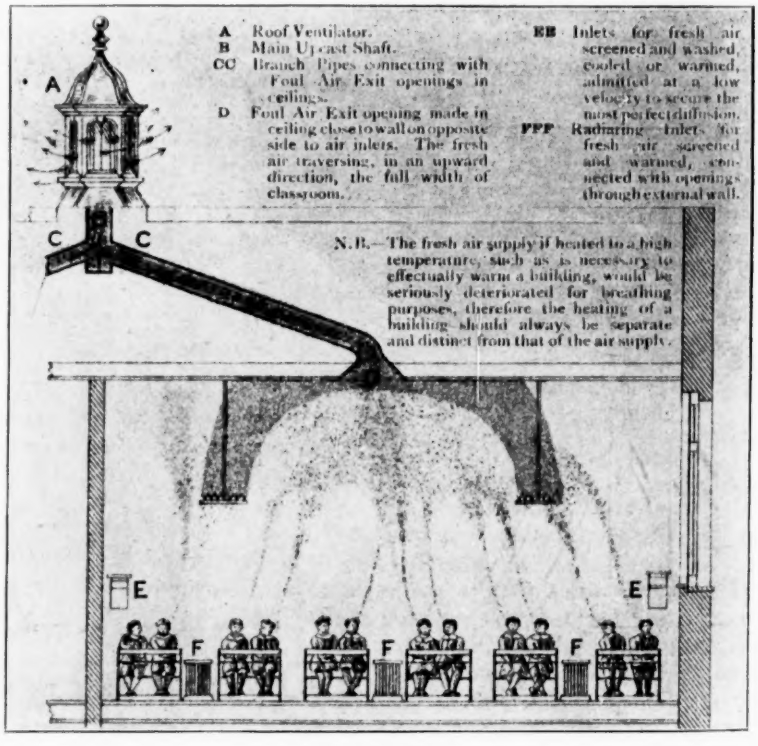
A Roof Ventilator.
B Main Upcast Shaft.
CC Branch Pipes connecting with Foul Air Exit openings in ceilings.
D Foul Air Exit opening made in ceiling close to wall on opposite side to air inlets. The fresh air traversing, in an upward direction, the full width of classroom.
EE Inlets for fresh air screened and washed, cooled or warmed, admitted at a low velocity to secure the most perfect diffusion.
FFF Radiating Inlets for fresh air screened and warmed, connected with openings through external wall.
N.B.—The fresh air supply if heated to a high temperature, such as is necessary to effectually warm a building, would be seriously deteriorated for breathing purposes, therefore the heating of a building should always be separate and distinct from that of the air supply.
A
C C
E
E
F
F
F

Figure 10.

system. I have observed in my reading on the forced draught system that not only it is sometimes necessary to supplement its heating powers by the addition of a direct radiation system, but one of its advocates, in discussing the fresh air supply, makes the following admission:

In hospitals, from a theoretical standpoint, too much air can not be supplied—in practice it frequently runs up to 100 cubic feet per minute and over. In the hospital of moderate size the plenum system will meet all requirements, but under certain circumstances in more complicated structures, it becomes desirable to assist its action by exhaust fans.

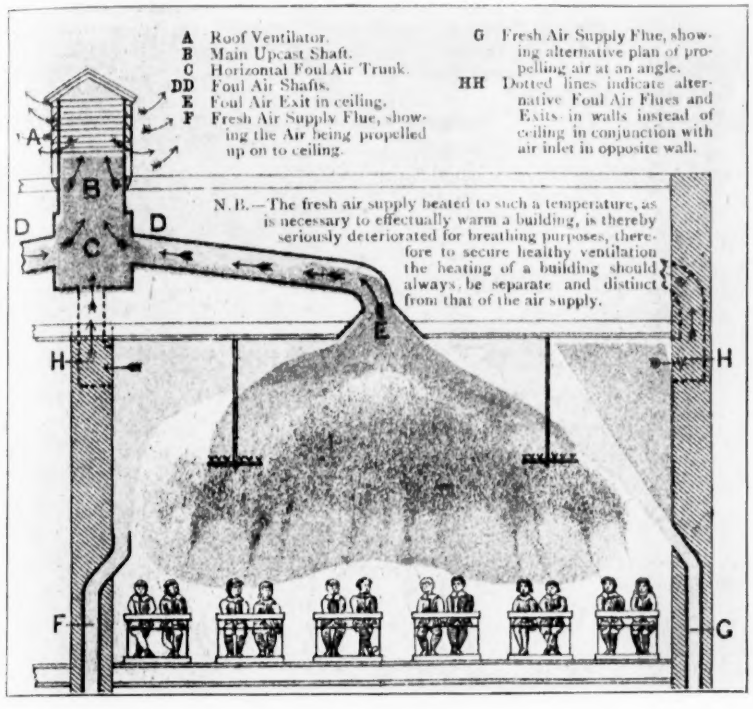
A Roof Ventilator.
B Main Upcast Shaft.
C Horizontal Foul Air Trunk.
DD Foul Air Shafts.
E Foul Air Exit in ceiling.
F Fresh Air Supply Flue, showing the Air being propelled up on to ceiling.
G Fresh Air Supply Flue, showing alternative plan of propelling air at an angle.
HH Dotted lines indicate alternative Foul Air Flues and Exits in walls instead of ceiling in conjunction with air inlet in opposite wall.
N.B.—The fresh air supply heated to such a temperature, as is necessary to effectually warm a building, is thereby seriously deteriorated for breathing purposes, therefore to secure healthy ventilation the heating of a building should always be separate and distinct from that of the air supply.

Figure 11.

The Houses of Parliament in Berlin were also originally equipped with the down draught system, but the sanitary engineer in charge of the work, being doubtful of the efficiency of the method, planned and provided for an up draught system also. After a practical trial of the down draught system it was considered eminently unsatisfactory for heating and ventilating the parliament chamber, so the up draught system already installed was brought into use, and at present it seems that the down draught system is used for one hour before the assembling of the members at the parliamentary sessions for a preliminary warming of the chamber, and the up draught system is used during the sittings to preserve the freshness of the air and to maintain a satisfactory temperature while the chamber is occupied by members and spectators.

A personal letter from Dr. C. J. McCormick tells me that the down draught system that I have exhibited to you in the Waltham Hospital has been in satisfactory use for thirteen years. Sir Douglas Gallon, F.R.S., in his "Report of the Barracks and Hospital Improvement Commission," says:

> The writer has visited on several different occasions three of the important hospitals in Europe and the United States of America, in which the ventilation depended on propulsion, and on every occasion the propulsion happened to be out of use for the time.

Taking all things into consideration, it is probable that the most satisfactory and by far the cheapest method of heating and ventilating hospital wards and possibly school rooms in this climate, is by direct radiation, the admission of fresh air through short ducts, which on entering the room or wards pass through the radiators, and the allowing of foul air to pass out of the room or ward near the ceiling—in other words, one of the forms of up draught ventilation. Billings says:

> The proper position of the foul air registers depends on the purpose of the room and on the season. In large assembly halls and especially where it is desired to provide for respiration, air as pure as possible instead of foul air diluted to a certain standard, the discharge openings should be above. . . . When we come to deal with rooms having a large floor area in proportion to the height and containing fifty or more persons whose heat production is a factor that must be taken into consideration, there is some danger that in the down draught method there will be an unsatisfactory distribution of the fresh air when the temperature of the external air is not below 50 degrees F.

If we do not use the down draught system—if we do not use a fan either for the impulsions of fresh air into a building or the extraction of foul air from it there are but two methods left that we can

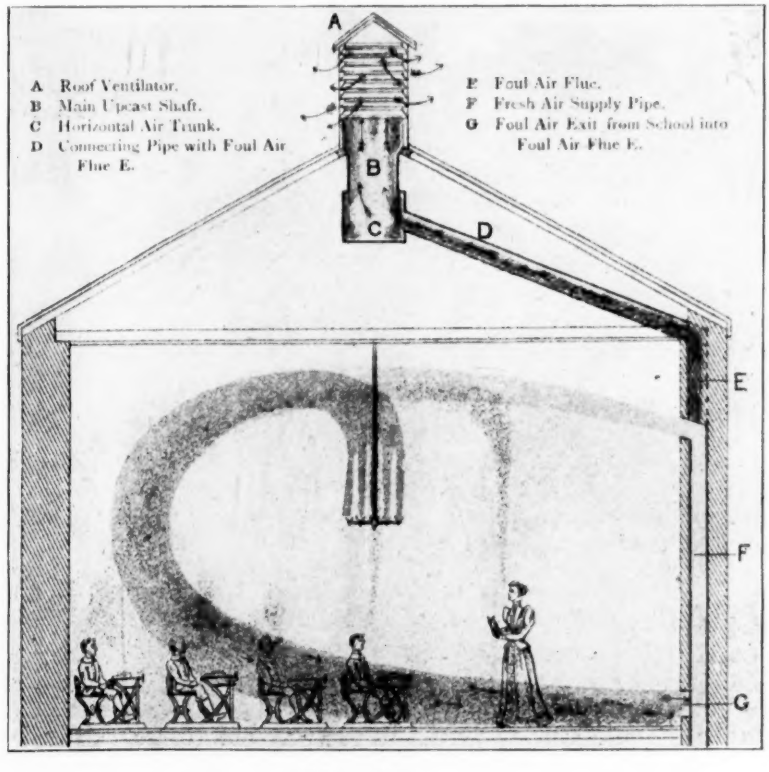
A Roof Ventilator.
B Main Upcast Shaft.
C Horizontal Air Trunk.
D Connecting Pipe with Foul Air Flue E.
E Foul Air Flue.
F Fresh Air Supply Pipe.
G Foul Air Exit from School into Foul Air Flue E.

Figure 12.

choose from. One is to bring the cold air into the building through a short duct—allow the air to be heated at a radiator and then to allow it to pass off through an up-cast shaft through

or near the ceiling. It is held that it is frequently necessary to aid the extraction of the vitiated air by placing small radiators in the extracting shafts so that the air in these shafts shall be heated and thereby acquire an upward movement. It is pointed out that this is a waste of heat, for the radiated heat subserves no other purpose than that of warming the air in the shaft and is an expensive motive power. This may be admitted, but is probably balanced by the necessary overheating of the very much larger quantities of air required to be delivered by the plenum system. In

Figure 13.

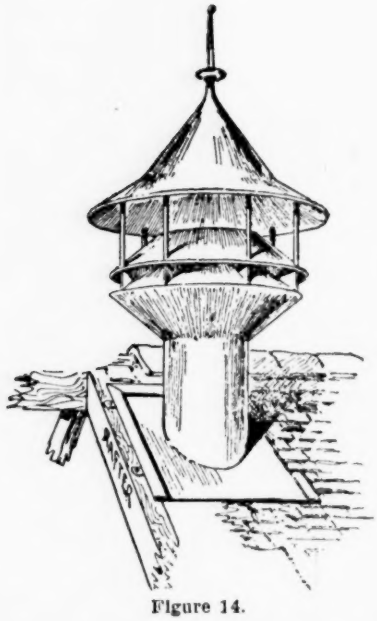

Figure 14.

many structures these vents can be run to the smoke stack from the fire boxes of the boilers and will there be heated sufficiently to maintain a good up draught. One of the most reasonable methods that I am acquainted with is that of an English engineer who has planned what he calls a natural method of ventilation, although this term is usually applied to ventilation by means of doors and windows, which the sanitarians consider as no ventilation at all. In this Boyle system the heating and ventilating systems are independent. Radiant heat is used. Boyle's summary description of and rehearsal of the advantages of his system is as follows:

Natural ventilation properly applied is the most constant and reliable. It requires little or no attention, is always in action and can not get out of order or break down, as so often happens in mechanical ventilation. Care should be taken in the employment of ventilators that they are of correct construction and that both the outlet and inlets are sufficient in size and number and so placed as effectively to accomplish the work they have to do.

The outlet ventilators should be fixed on the highest part of the roof, clear of all obstructions, so that the wind can reach them freely from every quarter. (Figs. 13 and 14.), The fresh air supply should be properly proportioned to the extraction. The combined area of the inlets should in all ordinary cases be at least equal to that of the outlet shaft. Main exhaust shafts should be at least of equal area to the combined area of the branch pipes. Branch pipes should have as great an upward angle as possible and should never enter

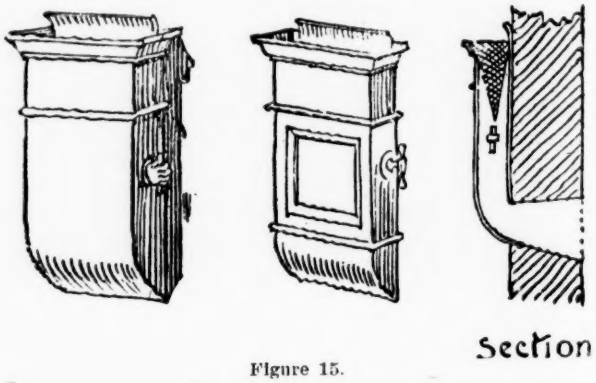

Figure 15.

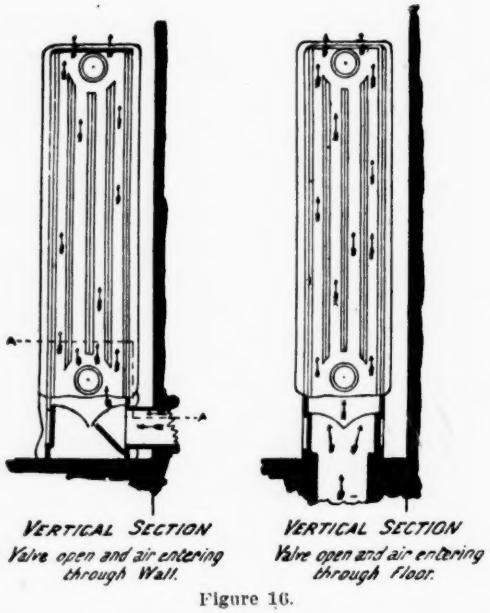

Figure 16.

the main shaft at the same level unless when parallel. All pipes should be made of metal and circular in shape to reduce friction. The vitiated air should be extracted at the ceiling, to where it naturally ascends. The fresh air should be admitted directly through the walls at a low velocity in an upward direction through a number of small inlet brackets or tubes distributed around the walls to secure more complete diffusion and an equable movement of the air in all parts of the building. (Figs. 15 and 16.) Air never should be admitted in cold weather in a horizontal direction, as a dis-

agreeable draught would result. The velocity of the air supply should not exceed two feet per second. The inlet channels should communicate directly with the outer air, be as short as possible and easy of access for the purpose of cleaning. Long inlet channels are objectionable, as they harbor dirt and are difficult of access. Where simple tubes or brackets are used the tops should be about 5 feet 9 inches above the floor. Where the air supply is warmed it may be delivered at a lower level (that is where it passes through radiators in entering the room). The inlets should be fitted with regulating valves to control the air supply. The fresh air supply should not be overheated, as its hygienic properties are thereby seriously impaired. Heating a building by hot air should, therefore, be avoided, as injurious to health. Radiant heat is the healthiest and most effective. Where open fires are used, they should have a separate air supply, led directly to them from the outside air through a 3 or 4 inch pipe to prevent them drawing the hot vitiated air from above down into the breathing air, creating draughts and unduly affecting the ventilating arrangements. Figures 17 and 18 well illustrate the principle of this system.

Sanitarians and intelligent educators everywhere are clamoring for the proper and systematic medical inspection of school children and it behooves us whose province is the eye heartily to second their efforts and to urge on the tardy school authorities the paramount importance of this work not only in the preservation

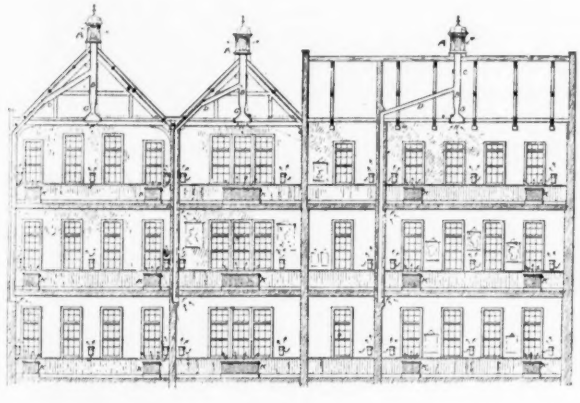

Figure 17.

of the general health of the scholars but also in the interest of their eyes.

I need not remind you of the value of the work of Cohn of Breslau, Williams and Ayres of Cincinnati, Agnew of New York, Derby of Boston and Risley and his associates of Philadelphia, in working up the subject of the production of myopia in school children by the ill-lighting of school rooms and the congenital anomalies of refraction in children whose vision has not been corrected on account of the neglect or ignorance of parents or teachers. We have already gathered together sufficient facts on this subject to justify a vigorous demand for the expert examination of the eyes of all school children as soon as they reach an age when they can be intelligently examined. We must not lose sight of the fact, however, that momentous as the subject of progressive myopia is, there are other conditions of the eyes that just as earnestly demand our attention. In a recent most excellent address on school sanitation, Dr. F. G. Byles of Denver tells us:

In ten months' inspection of Philadelphia schools 3,446 cases of infectious diseases were found. During the first five months of school inspection in Newark, N. J., in less than 6,000 pupils, more than 1,700 cases of infection were found. In Chicago, in four months, 1,417 cases of diphtheria and 306 cases of scarlet fever were found in the school rooms. . . . The inspectors in Chicago schools in five months of 1900 found 670 children with chickenpox, 55 with whooping cough and 648 with measles attending school.

To the members of this Section the infectious diseases, such as diphtheria, scarlet fever, measles and whooping cough, have each their own ocular significance in paralyzed muscles, conjunctivitis, keratitis, iritis and inflammations, and the serious results that we have seen follow the course of the acute infections should be communicated to the authorities as an additional argument of the greatest weight for the prompt establishment of medical inspection in all schools where it is not now in force. Any poison is virulent or harmless in proportion to its concentration or dilution. The air of school houses is necessarily vitiated by the exhalations from the lungs and bodies of the children. Add to it, in addition, the germs of infectious diseases, as we have just seen is so often done, and we can appreciate how vitally important it is that the ventilation of school houses should be as perfect as possible.

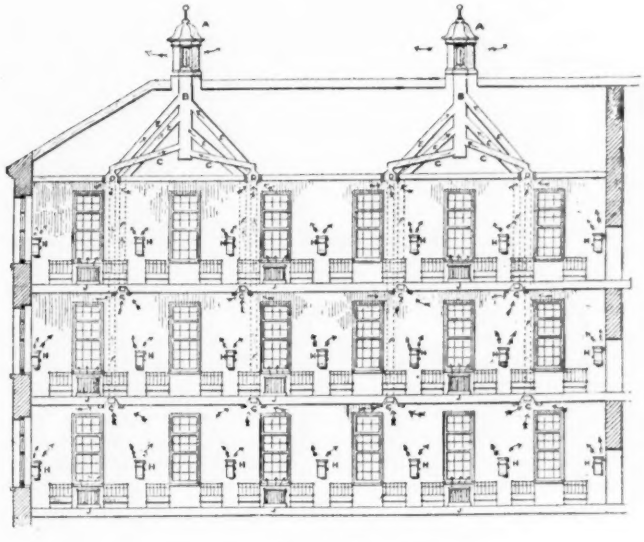

Figure 18.

The relation of the proper lighting and ventilation of school houses to the health of our children is so intimate, and we already know so well what should be and what should not be, that it is our duty to the commonwealth to insist that expert advice should always govern in the erection of a school building, and we must not cease in our demand for what is right until we have a competent medical inspector at every school house at the assembly hour to send the ailing children to their homes and to protect the healthy children in the school house.

In conclusion, I will read a very much condensed summary of the methods of heating and ventilating found in various Eastern hospitals and public buildings and noted by the architect of our new Cincinnati General Hospital during a recent trip that our commission took to Washington, Baltimore, Philadelphia, New York, Boston, Buffalo and Cleveland:

WASHINGTON.

Congressional Library.—Hot-water heating. Partly direct and partly indirect. Independent hot-water heaters under each wing. Small fans used in summer only to force fresh air into the various reading rooms. No fans used in heating. Ventilation by aspirating shafts.

Garfield Hospital.—Old building, direct steam; new building, indirect steam. No fan.

BALTIMORE.

Johns Hopkins Hospital.—Hot-water heating; gravity system. Indirect in wards; direct in corridors and offices. Ventilation by aspirating shafts.

PHILADELPHIA.

Medico-Chirurgical Hospital.—Hospital wards and clinical amphitheater heated by motor-driven fan through indirect steam coils. Offices, corridors, etc., direct steam.

Hahnemann Hospital.—Direct steam heat; indirect in new amphitheater. No fan.

Pennsylvania Hospital.—Central building heated by hot-blast fan system; wards, indirect steam without fan; corridors, etc., direct steam.

University of Pennsylvania.—Laboratories (new), corridors, offices, etc., direct steam. Laboratories, operating room, etc., have hot-blast fans and eduction fans; latter not in use. Medical department, direct steam.

New Municipal Hospital for Contagious Diseases.—Indirect steam from central plant. No fans.

NEW YORK.

Presbyterian Hospital.—Heated with indirect steam coils operated by fan. The superintendent, Dr. Fisher, does not approve of system.

Mt. Sinai Hospital.—Equipped with hot-blast system and eduction fans on roof. Also direct steam heaters under all windows in wards and corridors. Fan system not used. When visited by committee ventilation was effected by opening the windows.

Lying-in Hospital.—Fan system—one set to blow in and one set to draw out. Also some direct radiation in each room. Blowing fans not used. Eduction fans only in use. This saves $3,000 per year.

New York Hospital.—Fan system, blowing tempered air through indirect coils. In use all the time.

St. Luke's Hospital.—Heating, direct steam. Exhaust fans used for ventilation; in use part of the time.

BOSTON.

Massachusetts General Hospital.—Old buildings, indirect steam; no fans. New buildings, double fan system, one to blow in and one to draw out; both in use.

Boston City Hospital.—A mixed system; partly direct steam and partly indirect steam, with aspirating coils. Surgical building, fan system.

BUFFALO.

General Hospital.—Hot-blast fan system; objected to; hard to work. No thermostatic control. No exhaust fans. Ventilating flues through roof.

CLEVELAND.

Lakeside Hospital.—Fan system through individual stacks. Bottom heat inlets (a mistake). Bottom vents carried down through basement to hot stack.

Original Articles

FIBROID GROWTHS OF THE ABDOMINAL WALL.*

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DENVER.

The comparative rarity of these so-called desmoid tumors may be seen by referring to very recent statistics gathered by Cabot[1] of Boston, who found but 3 of this nature in a series of 4,876 abdominal tumors encountered at the Massachusetts General Hospital. Ledderhose in 1890 was at some pains to collect 100 cases. More recently, Pfeiffer[2] cites 40 cases seen in the Tübingen clinic during the past 46 years, and adds to this 360 other cases which he gathered from literature.

The term desmoid, by which these growths have generally been described, originated with Johannes Müller in 1838, and was intended to designate tumors of the musculo-aponeurotic tissues of the abdominal wall (tendon-like neoplasms). My own attention was directed to these rather curious growths by three cases seen, respectively, at the New York Cancer Hospital, St. Luke's Hospital in New York and at the City and County Hospital in Denver. These cases were practically duplicates. Each occurred in a young woman between 25 and 35 years of age who had recently gone through pregnancy. In each the growth was in the region of the right rectus muscle and near the level of the umbilicus. In two the peritoneum was involved and required excision; in the other the peritoneal cavity was not opened. In one the size of the growth is described in my notes as "about the size of a pullet's egg;" in one it was the size of a small orange; in the other, that of a little baby's fist. In each of the three cases the hospital pathologist reported the growth to be a fibroid. Each patient made a prompt operative recovery. In two cases the fate of the patient after leaving the hospital is unknown to me. In the third, a patient operated on in the City and County Hospital in Denver in June, 1904, there has been no relapse as yet.

I have made but brief mention of my own cases, but on examining the literature of the subject I am struck by the fact that most of these growths occur in practically the same way.[3]

Pfeiffer analyzed 400 cases, and his observations are so valuable that I shall quote from them at length and without apology.

No cases are included in the category except those which really began in the muscles and aponeuroses. This excludes tumors beginning in the round ligaments, in the periosteum of the ribs, pelvic bones and vertebræ, and in the ligamentum teres, all of which may present themselves as tumors of the abdominal wall despite their peduncular attachment to the outlying tissues.

Desmoids, unlike sarcomata in the same situation, occur in the great majority of cases in women—the ratio being about 7 to 1.

In regard to the influence of previous pregnancy, Pfeiffer has data in 265 cases, and of this number 250 women, 94.3 per cent., had borne children—usually more than one. The tumor appeared, as a rule, immediately after delivery, and in only 15 is it expressly stated that the woman was pregnant when the growth appeared. Naturally, a majority of women were of child-bearing age; 146 were between 25 and 35, 41 were between 15 and 25, and 35 between 35 and 50. Only 15 women were over 50. In a considerable number the age was not given. A very few women were over 60. Of the few men observed, the common age was between 35 and 50. There are also a few cases recorded in children; some of these were undoubtedly congenital.

Heredity may be disregarded as a causal factor, and the very great majority of the growths were single.

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

1. Trans. Assoc. of Amer. Physicans, 1905.
2. Beit. z. klin. Chir., 1904, vol. xliv, p. 334.
3. The following are among those who have recently paid attention to the subject: Venot: Jour. de Méd. de Bordeaux, 1903, xxxiii, 417. Abadie: Montpell. Méd., 1903, xvii, 97. Bornemann: Hosp. Tidende, 1903, xi, 759. Sabadini: Bull. Méd. de L'Algerie, 1903, i, 261. Schlokonski: Beit. z. Lehre, von Bauchdeckenfibrom. Diss. Berlin, 1903. Druchert: Echo Med. du Nord, 1903, vii, 512. Silberberg: Bull. et Mem. Soc. Anat. de Paris, 1903, lxxviii, 677. Fredet: Ibid, 712. Hayemann: Ueber Tumoren der Bauchdecken., Diss. Halle à Lax. 1903. Larass: Ueber Desmoide der Bauchdecken, Diss. Leipzig, 1904. Eitel.: Northwest Lancet, 1904, xxiv, 228. Stein: Monats. f. Geburts. u. Gyn., 1904, xix, 360, and Pfeiffer.

Location.—In 185, or 72.5 per cent. of available cases, the growths were below the navel; of these 37.2 per cent. were to the right side, 27 per cent. to the left, and 8.2 per cent. in the middle line (absolute ratio, 51 per cent., 37 per cent. and 12 per cent.).

In that part of the abdominal wall above the umbilicus desmoids occurred much less frequently, in all 41, or 16.1 per cent; 17 on right side, 20 on the left side and 4 in the middle line (ratio, 41 per cent., 49 per cent. and 10 per cent.).

Of the total number 26, or 10.2 per cent., were neither above nor below the navel, but on a level with it—10 to the left and 16 to the right.

Finally, there were 3 in the region of the loins—2 on the right, 1 on the left.

Summary		R.	L.	M.
Above navel	41	17	20	4
Even with navel	26	10	16	0
Below navel	185	95	69	21
Lumbar	3	2	1	0
	255	124	106	25

The point of origin may be a more or less broad pedicle attached to fascia or muscle. Of 268 cases in 115, 43 per cent., the origin was from the rectus muscle. In 13 cases from the anterior and in 34 from the posterior lamina of the fascia, while in the remaining 68 the point of origin is not stated. In 47 cases, 17.5 per cent, the oblique muscles were the origin, in the following order of frequence: Internal oblique, external oblique and transversalis. In 45 cases, 17 per cent., the origin was the abdominal fascia; 10 times from the superficial and 35 times from the deep. In 29 cases the tumor arose from two muscles, and in 29 others so many muscles were involved that the origin could not be determined.

The fact that most of the desmoids arise from the rectus corresponds to their lateral location, and to other points in their localization, such as predominance in the right pubic region.

In form the tumor is usually roundish or rather ovoid. As a rule the long axis of the mass corresponds to that of the course of the muscles and tendons from which it arises. The direction of the growth is usually determined by the resistance encountered. Hence, in primiparæ and in nulliparæ the firmness of the abdominal wall anteriorly prevails over that in the rear. In such cases—relatively few—the tumor grows inward, and has a spheroidal or mushroom shape. When the walls have become lax from child-bearing, however, the tumor grows toward the surface, even when it arises from the posterior sheath of the rectus; showing that the resistance from behind (transversalis fascia, peritoneum and intestines) exceeds that of the abdominal wall in front. The least resistance encountered is in the muscles themselves in their long direction, this favoring the flattened or ovoid shape. When a tendon or muscle sheath is encountered a constriction results and the tumor grows above and below it, producing the so-called cuff-button form. Multiple constriction produces lobular forms, which may simulate multiple tumors.

While the attachment is usually broad, so that the mass lies in its bed like a disc, slender pedicles may occur. Frequently extirpation may be accomplished by shelling the tumor out of its bed. A capsule is usually present, but this becomes atrophic from pressure. It is not involved in the growth of the tumor in the majority of cases, but often when the growth exhibits sarcomatous tendencies a diffuse union of the tumor with the surrounding tissues is found, and extirpation can be effected only by the knife and scissors.

In many cases (especially in those reported from French sources), a connection is mentioned as existing between the desmoid and some osseous structure (false ribs, ilium, pubic bone). This is termed the bone pedicle. Although their existence has been denied, there is good evidence that such secondary bone pedicles sometimes do occur. Olshausen, who has seen such cases, believes that these pedicles may be primary. Such a view would confound desmoids with true tumors which originate from periosteum. In Pfeiffer's 400 cases, no less than 65 (16.25 per cent.) had osseous attachments, 35 with ilium, 8 with pubic bone, 6 with false ribs and 1 with spine. In two cases there was attachment to two bones—ilium and os pubis.

The rate of growth and size of the tumor vary extremely; in many cases several years, even several decades, may show hardly any change; then a sudden and rapid growth may set in. In other cases, the growth may be rapid at first, but when a certain limit has been reached (size of head) the growth may remain stationary for years. Rapid growth does not necessarily mean malignancy. Sometimes tumors are seen which prove fatal when their growth has been slow throughout. One patient who refused operation died in 18 months.

The usual size of a desmoid is from that of a hen's egg to that of a large fist. It is not rare to see them as large as a child's or adult's head. They may attain a weight of 2 or 3 kilos. Very exceptionally great weights have been recorded—up to 10 kilos. Some of the oldest reported cases had weights of 17 kilos, 22 kilos, etc. This may be explained by the fact that these tumors cause relatively little trouble, and hence may have been allowed to grow indefinitely before medical advice was sought.

It has very often been noted that the desmoids were first noted during pregnancy (including puerperium) or else began to grow rapidly at that time, to become stationary again after the childbirth was over. This happened in 99 out of 400 cases (about 25 per cent.) Growths extirpated during pregnancy may recur during a subsequent gestation.

In nulliparæ and in males, trauma is frequently accused as a cause (about 7 per cent. of the entire number).

Pathologically these desmoids are firm, hard masses, usually enveloped in a membrane. They creak when cut, the section being pale-red or whitish-yellow and tendon-like. The presence of escaped and altered blood may color the tumor a brownish hue. The texture, in general, is uniformly hard and firm—bundles of fibers may be seen in a network or sometimes in concentric grouping, dividing the area into nodes. The desmoid is poor in vessels, and hence areas of softening may occur. The edema which precedes it may be of such degree as to simulate fluctuation. These areas of softening often lead to the formation of cysts, and these are sometimes hemorrhagic.

Microscopy shows the bundles of fibers already mentioned closely adherent to the adventitia of the vessels. Where edema occurs, the bundles are pushed apart. More or less proliferating tissue is present—as shown by young connective-tissue corpuscles in the course of transformation into fibrillæ. When this immature tissue is especially abundant and collected into clusters the tissue of a sarcoma, round or spindle cell, may be simulated. This may lead to mistaken diagnosis when

a piece of tumor is excised before operation. Some cases thus diagnosed as sarcoma have not relapsed even when extirpation was incomplete; other cases diagnosticated as desmoid have rapidly recurred (the latter mistake is much more infrequent). A microscopic diagnosis in advance of operation can not be made with certainty and does not give any guide to prognosis as to recurrence. The amount of formative tissue present is likewise no criterion of benignancy or malignancy.

The "more or less cellular fibroma" is the most common type of the desmoid, especially in women. Pure sarcoma (round or spindle cell, and oftener the latter) also occurs, especially in men. Other types of sarcoma are rare or absent, save cysto-sarcoma. (It seems to me that all sarcomata should be excluded from this class.) As far as the material is available, 88.2 per cent. of all cases in women were cellular fibromata and 11.8 per cent. sarcomata; in men the two percentages were 75.6 and 24.4.

In only 14 cases, 4.67 per cent., was there a mixture of myxomatous tissue. There was a single case of pure myxoma and no instance of myxosarcoma. Calcification occurred in 4 cases. A doubtful case of suppuration of a desmoid is recorded.

Several authors record the presence of smooth muscle (fibromyoma). Of a number of alleged cases Pfeiffer selects some 5 as genuine. Others may be added, but description is not sufficiently thorough. All cases, real or alleged, are in women, but by no means confined to the round ligament region.

Under etiology some points have already been mentioned. Grätzer has elaborated an embryonal theory (confusion of mesodermic elements, both peritoneum and fibrotendinous portions of the abdominal wall being derived from that layer). Herzog has formulated a traumatic theory, based on the possibility of injury to the rectus muscle, formation of organized hematoma (muscle callus) and eventual tumor formation. This view has been well supported in literature, but can not be made to apply to other muscles when injured.

Sänger has apparently refuted both the preceding theories. Simple homologous tumors do not have an embryonal origin, while desmoids show no evidence of hematomatous origin.

Guinard and other French authors seek to connect all desmoids with the round ligament, as far as women are concerned. Cases in men are placed with sarcomata. This view is opposed by facts already cited.

As far as trauma to muscle is connected with pregnancy, etc., obstetricians are almost universally silent as to such injuries, hematomata, etc. The exception is Stoeckel, who has reported 2 cases of hematoma of the abdominal wall in pregnancy. Not only could he find no other cases in literature, but both his own occurred under peculiar circumstances, viz., severe paroxysms of coughing and with a general hemorrhagic diathesis.

Numerous cases of hematoma of the abdominal wall from trauma have been recorded in man, but none was ever known to cause a desmoid, unless we include certain cases of keloid, which present some resemblance. If desmoids arise from trauma they should be much more common in men. Certain lesions—indurations, hematomata, cysts, keloid—have been known to follow injury to the muscular region, but they follow closely on the latter. Desmoids, on the other hand, differ greatly from such sequelæ.

Ribbert's theory of tumors may be applied to desmoids. This is a modification or expansion of the old Cohnheim theory as applied by Grätzer. As applied by Lücke, it depends on the plasticity and distention of the abdominal wall as a result of pressure of the gravid uterus, thus favoring the proliferation of connective tissue elements by reason of diminished resistance—the best answer to this view is that we do not see desmoids follow distention from ovarian tumors and the like, while the sexual organs proper undergo a degree of softening which might favor proliferation of elements previously held in check. This feature of pregnancy can not be applied to the abdominal walls.

Wischnewsky has recently made exhaustive studies of the distended abdominal wall. He states that in pathologic conditions the muscles atrophy, while in pregnancy they undergo hypertrophy in which the fibrous tissues participate. Durante has made the same observation.

This fact enables us to exclude distention as an efficient cause. The connection of desmoids with pregnancy can not be explained in this way. With a normal hypertrophy of the fibrous structures occurring at this period, the presence of young connective tissue at once suggests a possible factor in the causation of these tumors. The coincident distention and stretching of the abdominal wall could then be invoked as a secondary factor. To produce a truly pathologic state it would still be necessary to call on the misplaced germinal matter dating from the embryonal period.

These three factors, viz., diverted or superfluous embryonal elements, a state of active proliferation of normal fibrous tissue and a stretching or loosening of the parts involved, only apply to pregnancy. In trauma there is not the stretching, but there is an edematous succulence which may produce an analogous result. Individual cases of desmoid following laparotomy scars, the pressure of a belt buckle for a long period, etc., could also be thus explained. A single blow, laceration, etc., may be and often have been alleged as causes. But the formation of a hematoma is not a necessary step.

In regard to symptoms, subjective disturbances are usually absent at first, and women seek operation for cosmetic reasons only.

When the growth reaches the size of an English walnut, pain may appear in various types, local or radiating, worse during the menses or present only at that time. In very nervous women, the presence of the pain may cause great discomfort; rarely convulsions or hallucinations, which disappear with extirpation. When the tumor grows rapidly, attaining a considerable size, patients complain of peculiar painful sensations, due perhaps to compression of nerves or to stretching of skin. Medical aid may now be sought and an erroneous diagnosis of malignancy may be made. Pressure symptoms are usually absent, as is also distress from external contact. Tenderness to pressure is usually absent as well. The skin may or may not be stretched and glossy; with large tumors *striæ atrophicæ* appear. Adhesion with the skin if of rare occurrence; when present it causes redness and edema and even ulceration, phlegmon and sepsis. The most cellular type of fibroma, with relapse of same, almost never involves the lymphatics.

Diagnosis is by no means so easy as might appear. When small and not adherent beneath, diagnosis is easy; no so when opposite conditions exist. Characteristic is the readily mapped out limits, the conformity in direction with the muscles, the degree of mobility—these may be made without narcosis. These desmoids of the rectus are naturally movable from side to side chiefly. Bouchacourt's symptom is of value—the patient sets her ab-

dominal muscles in voluntary contraction by rising from a chair without aid of the arms; during this contraction all mobility of the tumor disappears. If the tumor then becomes more prominent, it is probably derived from the superficial muscular layers; if it becomes less prominent, its origin is from the deeper layers. This maneuver may not succeed if the abdominal wall is either unduly firm or unduly lax. As compared with abdominal tumors of deeper seat, the parietal kind do not change their position with change of posture. Bulging outward is very characteristic of desmoids, this being much more marked than mere palpation would seem to indicate. Unless deep adhesions have formed there is no change of position during respiration.

Diagnosis, however, is often not only difficult, but apparently impossible. A large number of mistakes are on record in which desmoids have been confounded with other conditions—various cysts, tumors of the gall bladder, omental tumors, salpingitis, appendicitis and other intra-abdominal affections. Hence the necessity of differential diagnosis between desmoids and a host of other intra-abdominal conditions. Exploratory incision and exploratory laparotomy may be necessary. Narcosis will exclude hysterical tumors. Vaginal and rectal exploration may be of aid.

Treatment is purely surgical, and the desmoid should be extirpated at once. The surgeon must beware of too radical intervention, as the operation may leave a breach in the abdominal wall which can not be repaired. In pregnancy, extirpation is indicated in the early months, but in the later months operation must be deferred until after delivery; otherwise the operation scar would be likely to rupture. Some authors, however, do not advise waiting.

As even the smallest desmoids, when they arise from the posterior aspect of the rectus, may necessitate a peritoneal resection, such a contingency must be prepared for.

In operating, the incision must be in the direction of the long axis of the tumor. The skin and muscular layers are first divided. If the tumor is encapsulated, not adherent and sharply outlined, it may be removed by blunt dissection. If at any point it appears to have involved the investing tissues, free excision must be made. It is of no use to attempt a blunt separation of the peritoneum, and one should not hesitate to open the abdominal cavity. General narcosis must be employed. Successful cases of imperfect removal must not be allowed to influence the surgeon, for these are rare exceptions. Even when the desmoid can be removed extraperitoneally, it is sometimes wise to resect the peritoneum in order to prevent infection by facilitating drainage. Cases of peritonitis have been reported in which that membrane was not involved in the operation. Under such circumstances two cases have terminated fatally.

Resection of the peritoneum and extirpation of the tumor adherent thereto is, in general, best done as follows: At the edge of the tumor a small incision is made through the membrane and the tumor is excised. Sänger, who lost a case by hemorrhage into the peritoneum, proposed the use of "arcade ligatures" about the tumor which was to be excised.

If such large areas of peritoneum must be removed that the breach can not be closed by primary union, the wound must be made as small as possible by suture, after which the edges are to be stitched to the omentum.

Postoperative hernia is best prevented by separate suture of each plane. If necessary, the opposite muscles may be used for plastic purposes.

If the entire half of the abdominal wall is involved, the skin should be spared in the excision of the tumor; it may be of value in closing the breach if muscle plastic is available. If the flaps left in certain cases are redundant, König's plan may be followed; that is, the skin may be arranged in cock's-comb fashion and the subcutaneous tissues sutured together.

If suture in individual planes has been effected, there is no need of a retentive band. Under other circumstances a bandage must be worn for several weeks after complete healing of the wound.

The immediate results of operations on desmoids of the abdominal wall have been relatively favorable since the introduction of asepsis. Discarding some of the older material Pfeiffer has notes of 285 patients operated on. Of this number the abdominal cavity was opened in 119, 40.8 per cent. The primary mortality in these cases was 10 cases, 3.5 per cent. In 142 cases, 49.8 per cent., extirpation was effected without opening the peritoneum. The mortality here was 3 cases, 1.05 per cent. In 24 cases details as to peritoneum fail. The combined mortality was 4.55 per cent. Of the 13 cases, 7 patients died of collapse or secondary hemorrhage and 6 of peritonitis.

In regard to ultimate results Pfeiffer avails himself of 107 cases, 85 females and 22 males. Relapse occurred in 33, 39.8 per cent.—15 males, 18 females. In 17 cases, relapse was fatal—11 males, 6 females. Hence, relapse occurred in males in 68.1 per cent. and was fatal in 50 per cent. Relapse occurred in females in 21.2 per cent., mortality but 7 per cent.

Late relapse occurred at varying intervals. In no case did it occur in the first 3 years among the women (40 cases studied), but 2 men had relapsed (out of 5 studied) within that period. In the cases of late recurrence studied in women, 3 in all, the interval after operation was 4, 7 and 9 years, respectively. In the 2 cases of early relapse in men, there was a history of repeated relapse; in one the interval was brief, in the other 14 years.

It is but natural to assume that the smaller the growth at the time of extirpation the less will be the liability to recurrence.

DISCUSSION.

DR. ROBERT F. WEIR, New York, said that this is a rather rare affection, but he has met with it twice and both cases were in young unmarried women between the ages of 30 and 35. The first tumor he thought was an ovarian tumor with very solid contents. He made an incision which revealed the fact that it was not in the abdominal cavity. The adjacent tissues peeled off readily and the mass weighed fourteen pounds. The attachment was along the line of the right linear semilunaris. The patient recovered with a fair condition of the abdominal wall and remained well for several years when she passed from his observation. The younger patient had a little different tumor in the lower right side. It was removed by incision; the attachment was in a similar situation, but it demanded some sacrifice of muscular tissue. Under the microscope it was pronounced to be purely fibrous, but it recurred eight months afterward, when after removal it was pronounced to be a spindle-celled sarcoma. If it had been carefully examined all over by the pathologist it would probably have shown in some parts of the eight pounds that it was a spindle-cell sarcoma. It recurred again, and was again removed when it had recurred, but he refused to do anything further surgically. She was treated by erysipelas toxins by an expert, under which treatment she improved to some extent, but eventually she returned to the hospital and died

from the tumor. This case shows that these large masses are at times malignant. In the second procedure help was derived by liberating the peritoneum from the adjacent extraperitoneal tissues. In this way adhesions were avoided.

DR. EMMET RIXFORD, San Francisco, mentioned a similar case occurring in a young woman of 27 who had been pregnant some time before the tumor was discovered. The tumor grew slowly but continuously and when operated on it measured 4x8 inches. It was somewhat the shape of a modern football, was smooth in outline and situated in the anterior abdominal wall at the outer edge of the left rectus muscle. The operation was simple. The growth, which was situated in the internal oblique muscle, was simply shelled out. The peritoneum was not opened. The muscles were drawn together with chromicized cat-gut and wound closed. Although the operation was done some ten years ago and the patient has since been through two childbirths there has been no recurrence of the tumor and no hernia. The tumor was diagnosticated as sarcoma but it was definitely a desmoid, although the pathologist was unable positively to exclude malignancy because some of the areas in the tumor were evidently sarcomatous while other areas were apparently of simple fibrous tissue.

DR. ALEXIUS A. MCGLANNON, Baltimore, stated that recently he had a similar tumor for three years. After operation the patient was free from the growth for fifteen months and then it recurred and was again removed. The first tumor was a soft fibroma, while the second showed all the varieties of malignant connective tissue tumors. It was lobulated, some lobules showing fibro-spindle-cells sarcoma, and some mixed spindle and round cells. The second operation was only done in May, so that Dr. McGlannon does not know the results. The fact that the tumor became more prominent after contraction of the abdominal muscles was considered important, indicating a superficial position; but the tumor involved the entire thickness of the wall from subcutaneous fascia to peritoneum, and became prominent when the muscles were contracted because of intra-abdominal pressure.

DR. J. P. CONNELL, Fond du Lac, Wisconsin, reported two cases, one of which was a tumor of the rectus muscle, the size of an egg, which has not recurred. The second case occurred six months ago, and the tumor extended from the erector spinæ almost around to the ribs. He took a section of the growth and the pathologist reported a fibroma; he then advised removal. He dissected the growth out from the rectus muscle, a great deal of which was involved, as were several other abdominal muscles. The attachment extended to the periosteum of the ribs and in operation he removed a section of several of them. The patient made a good recovery. In his dissection he made a large flap and after turning out the growth stitched the flap back into place.

DR. O. O. WITHERBEE, Los Angeles, reported a case involving the left rectus muscle following an operation for salpingitis. The microscope gave a spindle-cell appearance but not exactly of the sarcomatous type. To have removed it would have left the patient without any abdominal wall, and he therefore advised using the Coley fluid. The patient had been reduced in weight to 85 pounds when beginning the serum, so that the prognosis was most unfavorable. He used the serum under protest, but it looked like a last resort. At first it was used every other day, in sufficient quantity to produce a reaction; in a few weeks it was used every third day, and later every fourth day, until after six months it was used only once a week. The patient now weighs 120 pounds, and there is only just a suspicion of the tumor left.

DR. JACOB A. FULTON, Astoria, reported a case of fibroid tumor of the abdominal wall on which he operated 16 years ago. At that time he considered it a rare disease for he found few reported cases. In its removal a portion of the peritoneum about the size of a dollar was removed and although the patient had secretly eaten a large number of dried prunes before the operation, and vomited prunes in large quantities, the operation was successful and no hernia followed. There has been no return of the disease.

DR. L. L. MCARTHUR, Chicago, mentioned one case of this type which well illustrates the difficulties of diagnosis. The growth was so mobile that it was transferred from the gynecologic to the surgical department of the hospital. On opening the abdomen Dr. McArthur found a tumor with a broad, flat ribbon-like base extending from nearly the umbilicus to the symphysis. He thought that he had to deal with a long pedunculated uterine fibroid. The interne, in his bi-manual manipulation, had been able to detect that when the tumor was pushed down the abdominal wall was also dragged down, especially under the right rectus.

DR. MAURICE H. RICHARDSON, Boston, stated that Dr. Willoughby's reference to Coley's treatment brought to his mind an inoperable case of fibrosarcoma of the abdominal wall so successfully treated that a hernia developed in the scar of exploration through a space occupied originally by six or eight inches of dense tumor. Dr. Richardson has seen several cases of fibroid tumors of the abdominal wall. Whether they were of the desmoid variety or not, he cannot say. The practical point in the treatment of any neoplasm extensively involving the abdominal wall is the closure of the gap left by its removal. He has recently succeeded in filling in the gap left after removing the muscles of the left lower quadrant, which, with a portion of the os pubis, had been involved in the fibrosarcoma of great extent. The muscular belly of the tensor vaginæ femoris, with the fascia lata, was reflected from the thigh and sutured to the edges of the gap, as shown by these blackboard drawings. A firm and serviceable abdominal wall has resulted.

DR. CHARLES A. POWERS stated that it is difficult to distinguish between certain types of fibromata and sarcomata, and that the best that can be done is to get a reliable pathologist's report on the tumor. Dr. Powers stated that his paper dealt only with fibromata. In referring to Dr. Richardson's case Dr. Powers quoted Dr. Jacobi of New York who reported a case of extremely high temperature which he had observed; a number of men disputed the accuracy of his observation whereon Dr. Jacobi said that when the clinical facts collide with previously existing scientifific knowledge the latter goes to the wall and the facts stand. Dr. Powers said that he is quite ready to accept Dr. Richardson's conclusions.

CYSTS OF THE SPLEEN.*

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Splenic cysts, unaccompanied by cystic formation in other structures, do not often occur. The classes found are: 1, Dermoid cysts, one of this type being reported by Andral; 2, simple, serous, or blood cysts, of which a few cases have been reported; 3, echinococcus cysts. Although the latter usually occur in association with similar cysts in other organs, there are reported, according to Coen, as quoted by Douglas, 61 cases of solitary splenic cysts, although the spleen is involved in only from 1 to 3 per cent. of human echinococcus.

The etiology of cysts of the spleen in the case of dermoids and echinococcus may be summarily dismissed with the statement that it is the same as in other structures. Simple serous or blood cysts are of more interest. They are called by the last name of the three by certain authors from the fact that they are all thought to occur from an extravasation of blood within the organ or its capsule, the sanious contents remaining indefinitely or being replaced by a fluid, sometimes clear, sometimes straw-colored. Others, however, attribute the serous and the blood cysts to different causes. Andral reported a case of simple serous cyst in the center of the spleen, and Leudet a multilocular cyst in a spleen that was not enlarged. Boettcher found a multiple serous cyst in an amyloid spleen and noted that some of the

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cysts were traversed by fine trabeculæ of connective tissue. He attributes the cause of these cysts to occlusion of the arterioles, due to the amyloid change with fatty degeneration and ultimate softening and sloughing of the splenic parenchyma. For the most part, however, we can say that serous cysts in the spleen are formed precisely as elsewhere. The enlargement and the associated changes accompanying chronic malaria seem to favor the formation of splenic cysts, as is shown in the case of Livois, Marcano and Fereol, Spencer Wells, H. C. Cutcliffe, Giuliano, and myself.

Blood cysts are found more frequently than simple cysts, and essentially follow hemorrhage into the splenic substance or, as happens in the majority of cases, just beneath the capsule. This variety of cyst forms more rapidly than any other, in the nature of the case. However, full development is not necessarily reached early. In Credé's case ten years intervened between the time of traumatism and of operation. Irregular development is seen in some of them, periods of rapid increase alternating with periods of quiescence, caused by additional hemorrhages.

Cysts of the spleen contain a capsule, lined with endothelial cells, except dermoids, which are lined with epithelium. The capsule is made up of fibrous tissue containing now and then unstriped muscle fibers. In Foerster's case the cyst was surrounded by cartilage. Hydatids give us a more complex capsule, externally is a more or less complete layer of fibrous tissue, adventitious in origin, the cuticular membrane separating, as it were, the structure of the containing organ from the echinococcus capsule proper, the endocyst. This inner wall collapses and curls up when removed, has a characteristic lamination of seven or eight layers, and has a gelatinuous appearance. The endocyst has an external wall and an internal, the former having the appearance of "highly elastic, lamellar cuticle," the latter that of "granular matter, cells, muscle tissue (unstriped), and a water-vascular system," according to Sutton. Extending from the lining of the hydatids we expect to find daughter cysts, although it is a well-known fact that they are not uniformly present.

The simple serous cyst contains a fluid varying from clear colorless to straw-colored. In this fluid are to be found sometimes a small amount of débris from more or less completely broken down cells. The specific gravity varies from 1000 to 1028 or 1030, and Ruess has formulated a table to determine the amount of albumin approximately from the weight of the fluid, the essence of which may be stated thus: Below 1008 there is little or no albumin; at 1008 the albumin is 0.2 per cent., and for each point of increase in specific gravity there is between 0.3 per cent. and 0.4 per cent. increase in the amount of albumin, being nearer 0.4 per cent. than 0.3 per cent. For example, at 1008 the amount, as stated above, of albumin is 0.2 per cent.; at 1009 it is 0.6 per cent.; at 1010 it is 1.9 per cent.; at 1011 it is 1.3 per cent. It must be remembered that hemorrhage into a simple cyst will give contents similar to an original hemorrhagic cyst and will thus produce confusion as to the original nature of the fluid. However, it is claimed by some, as mentioned already, that the simple cyst of the spleen originates from hemorrhage.

Blood cysts of the spleen have been found far more frequently than simple cysts. Yet, as Loomis and Thompson claim, it is probable that some of these are simple cysts into which bleeding has taken place. The same characteristics of fluid are seen that blood may assume when long confined anywhere in the body. The color of the fluid is black, brown, reddish yellow, red or yellow, and if the cyst is of long standing the contents vary in consistency according to the extent of absorption and the abundance of serum.

In reviewing the cases of cystic spleen exclusive of echinococcus it is found that the contents vary largely in the proportionate distribution of the chief constituents. The fluid is degenerated blood in most cases and may contain red and white blood cells, cholesterin crystals and shreds of tissue. A case reported by Pean had calcareous granules in the fluid. Terrier's case had blood clots which brightened on contact with oxygen. Piccinelli reports an ossified cyst of the spleen. It is rare to find a splenic cyst in which the greater part is made up of cholesterin. Andral, in 1829, found a splenic cyst with fibro-serous walls whose interior contained fatty matter, like tallow, in the midst of which some hairs were scattered. This has been classified as a dermoid cyst.

Echinococcus fluid is clear, free from albumin, neutral or alkaline in reaction and of a specific gravity of 1004 to 1010. Small amounts of grape sugar and albumin are at times found, but the specific gravity, according to Ruess' table, can not allow large percentages of albumin. Inorganic salts occur in considerable amounts, while inosit and succinic acids are occasionally seen; traces of urea and creatin have also been found. Boinet and Chazoulier discovered and isolated the toxic ptomains of this fluid. The best evidence is in the hooklets and scolices of the parasite. Besides these there are observed at times shreds of faintly yellow membrane. These alone constitute a positive diagnosis of hydatids, and yet these microscopic findings are not always present. Virchow was the first to recognize the true nature of echinococcus multilocularis which had theretofore been accepted as colloid carcinoma. Numerous small round cavities filled with a gelatinous fluid constitute in the aggregate a large mass resembling a tumor. The central cavities are often found broken down, or fused, as it were, into a large cavity. Here scolices are rarely found. Daughter cysts become separated occasionally from the maternal growth and lie loose in the fluid, escaping, it may be, in great quantities with the liberated contents. When the primary cyst produces no buds, it is called acephalocyst.

Cysts of the spleen, when small and uncomplicated, present no symptoms and pass unnoticed to the post-mortem table or to the grave. When, however, complications or considerable size become features of such a cyst or cyst group, then physical signs and symptoms are present, although they are, by no means, always clear enough to make a diagnosis. Out of seventeen cases in which attempt was made to show some previous or present possible etiology there were five cases preceded by traumatism, five by malaria and two by both. One patient died of mitral affection and two of Bright's disease. One patient developed the initial symptom during an attack of mumps. One developed immediately after parturition, and a second followed parturition, succeeded shortly by trauma. So that we see seven out of seventeen had a history of malaria, in some of whom enlargement of the spleen had been recognized before the cyst formed; and eight, not including one parturient patient, had traumatism over the spleen. Where sex is mentioned the division is equal. The youngest patient having simple or blood cyst was 7 years old. The patient, if the cyst be large enough to call his attention

to the fact that a tumor is present, gives a history of the first appearance being in the left hypochondrium and growing down from under the ribs. This he may reduce with more or less completeness back into the original site, but such restoration is, of course, limited by the size of the growth and the extent and density of adhesions. Out of eleven cases of simple and blood cysts only two were fixed. Recognition of cyst development in a misplaced or wandering spleen would be a practical impossibility unless diagnosis of the wandering spleen had been made before cyst formation had begun. In Bardenheuer's case the spleen was in the pelvis. Pressure symptoms and those produced by dragging are the chief subjective evidence that anything has gone wrong. Adhesions aid these in producing symptoms in the case of echinococcus. The habits of a patient or his place of abode may give beneficial help to determine echinococcus, but these have no bearing on simple serous or blood cysts, except in so far as malaria is a causative agent. Nausea and vomiting, together with pain in the left hypochondrium, occur. By pressure, retention of the feces or obstruction of a ureter occurs, or pressure against the diaphragm, heart and lungs is so intense as to produce dyspnea. Some of the cases have had severe colics and some have developed ascites and edema of the legs. Mosler has stated that pain is an early symptom in echinococcus of the spleen, beginning in the left hypochondrium and extending into the lumbar region. In Martineau's case pressure of the enlargement on the lumbar plexus caused pain in the left lower extremity, diminished tactile sensibility and flexion at the hip joint.

The tumor, if large enough to palpate, is found to be movable and easily reducible into the original splenic site in all of those cases of cysts which have not become inflamed and adherent or which are not too large, and in echinococcus which habitually produces more or less peripheral adhesions to adjacent structures so that we may not be surprised to find it thoroughly immovable by manipulation and respiration, and we rarely expect to see it movable without any limitations except the normal supports of the spleen.

The growth may present a fluctuating mass or, if echinococcus, may give the hydatid thrill, but by no means constantly. This is absent in 50 per cent. of cases, especially in solid or deep cysts, and it appears in other conditions, viz., ascites and ovarian tumors, some authors claiming higher frequency for it in the latter conditions. Hence, its diagnostic value is little. The surface may be smooth and even or give a lobulated presentation to the hand, caused by multiple or multilocular cysts.

On aspiration the fluid found will give a clue to the diagnosis. But when suppuration has occurred the characteristics are so obscured as often to be worthless. If there is any probability of such a cyst being hydatid or having suppurated, aspiration should by no means be resorted to for diagnostic purposes.

Differential diagnosis may be made between cystic spleen, on the one hand, and, on the other, abscess of the spleen, ovarian cysts, pancreatic enlargement, hydronephrosis, cysts of the mesentery, and hypertrophied spleen as found in malaria and leukemia. The site of the tumor, the direction of its growth, its attachments or, what amounts to the same thing, the directions in which it may be moved, the pressure and traction symptoms, the constitutional condition of the patient at the time and prior to the beginning of the growth taken together make it possible in some instances to differentiate correctly in these rare cases. In others, even the majority, the surgeon simply will recognize that he has a surgical condition, changing or confirming his first opinion on opening the peritoneum.

Spleen cysts last for years without producing symptoms, remaining in *statu quo,* or gradually or suddenly attaining large size. Echinococcus cyst may terminate by complete disappearance, due to death of the echinococcus or to deprivation of nourishment from calcification of the walls; the more usual termination, however, is by suppuration, or rupture, which may take place into any hollow viscus and allow escape of the fluid, producing a cure; or perhaps into the pleural cavity, causing violent symptoms and even rapid dissolution, or into the lung. The escape of hydatid contents into the body cavities is capable of producing secondary hydatids, as demonstrated by Martin's case. His patient, 37 years old, had had hydatids of the liver ten years and felt something give way in the upper abdomen. Shortly afterward he had pain in the back and the epigastrium, nausea, vomiting and rapid emaciation. On operation the cyst was found ruptured and both visceral and parietal peritoneum were covered with hydatids from the size of a nut to the size of a hen's egg. Though serious, perforation into the peritoneal cavity is not always fatal. Skoda narrates a case in which the principal symptoms were pain, rigors, wiry pulse and cyanosis. Patient recovered.

Henoch claims that the urticaria which sometimes follows the removal of the fluid is due to escape of a few drops into the peritoneal cavity.

The final outcome of cysts of the spleen varies with the type of cyst and the course it pursues. Small simple cysts cause no trouble. Larger cysts produce a more unfavorable prognosis. Blood cysts are more prone to grow, owing to repeated hemorrhages occurring within them. Echinococcus may rupture into a viscus and escape to the outer world, producing cure, or into an internal cavity resulting in death. When abscess formation follows a cyst the prognosis is that of the former. Complete cure follows these cysts rarely, by absorption, shrivelling and calcification of the capsule. This happens in echinococcus only when the tenia is dead, not invariably then.

I lay down as the first rule for treatment that these cases should be operated on by incision, not by puncture, if the cyst is large enough or is producing symptoms enough to demand treatment; I might more correctly, I believe, say if the cyst is sufficiently large to produce clear physical signs, whether the cyst belongs to one or the other variety, for in absence of hydatids elsewhere one can not make accurate differential diagnosis between them. Splenectomy is to be done in those cases in which the organ is so perfectly destroyed as to render it of no further service and not so completely adherent that its removal becomes hazardous. In cases where the spleen is not absorbed and in those where manifestly it can not be removed with safety, the better procedure will be to drain the sac after suturing to the abdominal wound. Giuliano, in an article on blood cysts, states that diagnosis can not be accurate, and then advises either puncture or celiotomy, leaning to the former, if one may judge from the text. Splenectomy, he says, is not warranted in this class. In his researches he has found 15 cases besides his own. Excision of the spleen seems to me a far more judicious operation than simple

removal of the diseased area. Hemorrhage can not fail to follow the latter far oftener than the former.

Tapping, injections and excision have no field for usefulness; the treatment must be splenectomy or open cyst drainage. If, however, one can sufficiently assure himself that the cyst is serous or hematic, then aspiration once or twice cures; and, if on reaching the spleen and aspirating, there is no doubt of the condition, a cure may be relied on if all the fluid is removed and the wound closed.

I could find records of eleven patients with serous or blood cysts treated by aspiration, all of whom recovered; eight cases of splenectomy, including my own, in all of which cure followed. One patient was marsupialized after curetting, cured; four patients were treated by injection of caustics, two of whom died; two patients were treated by resection and cautery, both recovering.

My own case is as follows:

REPORT OF A CASE.

History.—Mrs. H. L. S., white, age 39, came to me November 24, 1904, being referred by Dr. J. H. Laws. Patient is American born, housewife. Her father died at 61 years of age of apoplexy. Remainder of her father's family living in good health. She is the mother of six children and had no disease except those of childhood, and "fever" when small. Three years ago she had tertian chills for a period covering about one year. In August, 1903, she first noticed an enlargement in her left hypochondrium, which gave her no pain until the spring of 1904, although it grew steadily. She complained of pain under the left scapula which ran forward and down the left side. Oppression in the region of the heart. The pain under the scapula was increased by pressure on the tumor. There was a dragging, pulling sensation in the hypochondrium. She had noticed an increasing shortness of breath on exertion; this had not been present previous to the development of the tumor. She had lost 14 pounds weight in the past year. She has, for the last month, had considerable nausea and vomiting.

Examination.—There was present on examination an enlargement extending from the margin of the ribs at the left hypochondrium to within three or four inches of the pubic arch. Fluctuation was present, the mass was fairly movable, moved on respiration, and could be reduced into the space underneath the left margin of the thorax, but escaped immediately on removal of the hand. There was no leucocytosis.

Diagnosis.—Multilocular cyst of the spleen.

Operation.—The abdomen was opened through the left linea semilunaris, the incision being six inches long. The cyst was more easily approached through the transverse mesocolon, owing to adhesions between this structure on its upper surface and the spleen. The growth with the spleen was removed without being opened; but on cutting the vascular attachment and attempting to lift the tumor out of the abdomen, cystic fluid escaped through one of the vessels and dropped into the pocket whence the tumor was removed. Hence, not knowing but that I had echinococcus to deal with, the edges of the space were sutured to the wound, which was drained for a few days. The patient left the hospital on the twenty-first day, entirely recovered.

The cyst wall was at places very thin; there were several large pockets intercommunicating, and the splenic substance was obliterated except an ounce or two. The cystic spleen weighed two and one-half pounds. The fluid was clear and colorless. Specific gravity 1006, contained no scolices or hooklets and no albumin. The lining of the cavity contained no epithelial cells and was smooth and glistening and easily separated from the surrounding tissue. The wall was laminated fairly well and contained white fibrous and a small amount of unstriped muscle tissue.

This was, it seems, a case of simple cyst of the spleen and the only etiology discoverable was the fact of a long siege of malaria preceding the formation. I have been unable to determine the connection between cysts of the spleen and enlargements due to malaria.

REVIEW OF CASES OF SPLENIC CYSTS.

Without presuming to make a rigid classification, I give below a brief review of the cysts of the spleen covered in the literature.

DERMOID CYST.

1. ANDRAL: Dermoid. Fibro-serous walls: containing a fatty matter, like tallow, and hairs scattered throughout.

SEROUS CYSTS.

1. GARCIA: Man, age, 36, syphilis six years ago, tertian fever cured by quinin; fall from horse causing contusion of abdomen followed soon; one month later localized pains in abdomen; digestion poor, enemas required. Tumor in left hypochondrium, which grew still another month. Puncture liberated odorless gas and tumor diminished; next day second puncture liberated quart of fluid color of white wine, clear, transparent sp. gr. 1004, contained albumin and sodium chlorid. Another puncture after three months, 300 grams; cured.

2. GAUGET: Laborer, age 46, alcoholic history, dyspnea on exertion for some months. Symptoms of asystole. Died in collapse. Autopsy: Spleen slightly enlarged and contained yellowish liquid in rounded regular pocket size of hen's egg, and a second the size of a walnut.

3. LEUDET: Multilocular serous cyst: volume of spleen normal, surface normal. Cavity of four or five cells in splenic tissue; fibrous wall pavimentous endothelium, and contained serous liquid. This was in a woman 60 years old, who had mitral affection.

4. FOERSTER: Serous cyst of spleen with cartilaginiform wall seen in the collection at Wurzburg.

5. CREDE: Man, age 44, pain five days following trauma over spleen. Tumor size of fist one year before operation in left hypochondrium; grew rapidly to size of fetal head fluctuant, mobile fixed at upper part; confused with hydronephrosis. Splenectomy. Cured. Fluid yellow, limpid, with numerous cholesterin crystals.

6. MATTEI: Autopsy: Man, age, 68; spleen weighed 370 grams; tumor size of orange, calcified at points on surface, cartilaginous at other points. Fluid yellow, transparent, contained albumin. The central cyst was size of turkey's egg and had seventeen smaller ones surrounding it. Under microscope, cholesterin, formless masses of lime salts, granulous globules and proteid detritus.

7. WILKS. Old woman died of Bright's disease. Cysts also in kidneys. Cysts of spleen size of walnut and a few smaller on surface. Lined with smooth membrane and contained serum. Says another similar specimen from a man who died of Bright's disease is in Guy's museum.

8. KLIPPEL & LEFAS: Man, age 71, attacked long ago by paretic phenomena of four extremities. Autopsy: Spleen weighed 235 grams, and contained a cyst the size of a large walnut, enclosing a clear yellowish liquid, a second cyst size of small walnut, easily enucleable.

9. BOETTCHER: Multiple serous cyst, amyloid spleen, cysts varied in size from flaxseed to pea, some of them traversed by fine reticulated trabeculæ. Lined with single layer of flat endothelial cells. Due, he thought, to occlusion of arterioles, from amyloid degeneration of their walls, with fatty degeneration softening and sloughing, in parts of spleen pulp.

HEMATIC CYSTS.

1. E. BOCCHIA: Male, age 24, traumatism over spleen six years ago; pain for some days. Had had present disease three and one-half years. Pains increased with tumor in left hypochondrium. Diagnosis splenic tumor. Puncture. Cured. Dense chocolate-colored liquid, alkaline, and had physico-chemical characteristics of blood. Evacuation next day by incision under cocain, on reaching cyst drew off 2,140 grams of fluid by trocar. Sutured wound. Healing per primam.

2. W. MINERVINI: Woman, age 44, robust multipara; tumor larger than adult head, in lower abdomen. Immovable. Fluctuating. Laparotomy. Splenectomy. Sero-hematic cyst in ectopic spleen. Claimed to be second thus far observed. Recovery.

3. PORGE: Purulent hematic cyst, size of walnut; cyst cavity enucleated, wall thick, fluctuant, yellowish gruelous odorless fluid. Numerous red globules; globules of pus and cholesterin crystals in fluid. From the report I judge this was found post-mortem.

4. BACCELLI: Woman, age 27; married three years, pregnant four months. Two months' back traumatism over spleen. Pains after four days, which grew worse. Tumor of left upper quadrant, fluctuant, moved with diaphragm. Diagnosis cyst of spleen, from direction of growth, its connections, and movement on respiration. Two punctures and drawing off hematic fluid. Cured.

5. G. CHAVIER: Soldier, constipated three days, with some colics; abdomen somewhat ballooned. Put to bed, dieted, given sod. sulphat. That night had violent abdominal pains. Purging had no effect; passed no gas during day. Kicked over spleen seventeen months before by a mule. Died. Autopsy: Much foul gas on incising peritoneum; cyst of spleen, size of a Savoy biscuit, rested on anterior surface of stomach. Not adherent. Contained reddish brown extravasation between capsule and splenic substance; 1,870 grams of fluid. In pocket was organizing brownish fibrous deposit.

6. A. HEURTAUX: Woman, age 27, single: Traumatism eight years ago. Pain continued in left side some days. Noticed a tumor a year afterward size of fist, not painful or movable. It had grown regularly since, till now it occupied three-fourths of left side of abdomen. Fluctuating. Diagnosis probably splenic cyst supposedly hydatid. Laparotomy: Cyst largely immobilized by serous leaf covering it. Drew off 9¾ liters, opened, curetted, irrigated, marsupialized and drained. Recovery. Fluid contained blood cells, leucocytes, granulo-fat cells and cholesterin.

7. LIVOIS: Man, age 46. Had severe intermittent fever four years before: tertian. After first attacks had pains in left side and noticed tumor, which grew to large size; fluctuated. Diagnosis cyst: connections not determined. Entered hospital for ulcer of leg. Did well and asked to be released. Eleven days

from entrance had violent colics, vomiting and diarrhea and died in three hours. Autopsy: Much reddish serous fluid in peritoneum. Cyst of spleen, size of ostrich egg, was found. It contained a great quantity of rosy matter, filamentous, and had much affinity with fibrin. Weight of spleen and cyst, 7 pounds. Liver was enlarged and stomach distended with greenish liquid.

8. PEAN: Woman, age 20, single. Two years ago had a swelling in the hypogastric region, with pains. Symptoms gradually increased, and became very violent two months before operation, finally unbearable. Tumor in hypogastrium like full term gravid uterus, but fluctuated. Opened abdomen, punctured, drew off 3 liters of thick viscous yellowish fluid. Removed most of cyst and spleen and cauterized remainder. Recovery. Fluid contained albumin, leucocytes, red blood cells, cholesterin and calcareous granules.

9. PEAN & ROUSSET: Girl, age 7, sero-sanguinolent cyst. Diagnosed by puncture. Treatment by caustic. Death two months from beginning of treatment followed by injection iodin, from acute peritonitis.

10. MARCANO & FERECL: Man, age 31, malaria three consecutive years. Three years ago spleen became voluminous, causing dyspepsia. Colics two years ago, dyspepsia, nausea and vomiting after eating. Symptoms again at end of two years, but became better, and recurred after another year. Tumor in epigastrium and left hypochondrium, fluctuating, spontaneous pains not increased by pressure. Puncture, resulted in drawing of 300 grams fluid, chocolate colored, viscous and containing blood cells. Treated by injection of iodin and permanganate of potash, one or other three times a day.

11. QUINTARD & PEAN: Woman, age 53. hematic cyst, treated by caustics. Death some days after opening pouch, due to splenitis and acute peritonitis.

12. KNOWSLEY & THORNTON: Girl, age 19. Painful tumor in left side two years, grew rapidly, fluctuating, movable. Diagnosis doubtful, but spleen was eliminated from low position. Splenectomy. Fluid reddish serous with cholesterin. Recovery.

13. SPENCER WELLS: Woman, age 21, married; at four years had intermittent fever lasting two years. Hypertrophy of spleen. Married at 19 years of age. After one year had diagnosis of ovarian or periovarian tumor. Another diagnosed tumor of left ovary. Had normal labor same year. Tumor descended, not attached to ovary, freely movable. Wells diagnosed hypertrophied spleen. Patient grew much worse. Diagnosis corrected by puncture. Cyst broke during operation, and contained 4 or 5 liters of reddish brown liquid, which showed red globules and leucocytes. There were numerous adherences. Incomplete removal. Cured.

14. FERRIER: Woman, age 33, married twelve years, three children. During attack of mumps one year previous had pains in left side of abdomen, which became larger, growth and pain persisted, tumor to left of umbilicus, size of fist, movable and had large pedicle from hypochondrium. Diagnosis cyst, perhaps hydatid of epiploon or spleen; examination was painful. Laparotomy, excision and cautery. There were many adherences. Contained fluid blood clots, black, but becoming red in atmosphere. Cured.

15. VERNEUIL: Said he had seen four cases of hematic cysts, three of which were cured by trocar.

16. CHALITE: Woman, age 36, had dyspnea, heaviness and abdominal pains. Two years before after parturition swelling of abdomen and edema of legs, abdomen enormous, left side more prominent. Tumor hard, painless, mobile rising below left false ribs. Diagnosis cyst of spleen, possibly hydatid. Splenectomy. Eight liters of brown liquid, in which rags of splenic tissue floated. Cured.

17. MARESCHI & GHETTI: Woman, age 42; severe pains in left hypochondrium twelve days after eighth parturition, lasting four or five hours, ceased after twenty-five days. Nine months later pain returning while carrying heavy object; four months later traumatism over spleen, and soon noticed small painless tumor that grew rapidly. It was movable, elastic, fluctuant. Splenectomy. Weight, 1,315 grams, contained blackish limpid liquid showing white and red cells. Recovery.

18. BARBACCI: Autopsy: Found cyst of spleen size of hen's egg. Transparent viscid fluid, color of gold flowed, coagulum of fibrin in pocket. He found a second cyst size of a lentil with similar fluid, alkaline and albuminous. He called this a lymphatic cyst.

19. H. C. CUTCLIFFE: Male, age 40, had intermittent fever four months and enlarged spleen. Twelve days ago swelling in left side under ribs, preceded two or three days by acute hypochondriac pain. Tumor hard and free from tenderness; after five days seemed to fluctuate. Punctured. Found degenerated blood. Cured.

20. SPILLMAN: Man, age 51, sick three days; this appeared suddenly, with violent shivering in left side, followed by a dry, painful cough, dyspnea. Died in ten days. Autopsy: Spleen contained cyst size of fetal head, contained yellowish liquid, cholesterin, fluid red by transmission. Density of water. Analysis proved to be hematic.

21. GIULIANO: Man, age 33. Malaria for some years, six months before coming to Giuliano had trauma of left hypochondrium and felt intense pain. Large tumor in left hypochondrium, connected with spleen. Puncture liberated degenerating blood. Recovery.

22. BAGINSKY: Girl, age 13, cystic tumor connected with spleen, resulted from trauma and increased gradually. Puncture brought 2 liters of red brown liquid containing many red corpuscles.

Below I give another group not definitely classified by the men who found them.

1. PICCINELLI: Priest, age 67, digestive disturbances thirty years before. In time oppression in epigastric region. Sharp, darting pain behind left hypochondrium five years ago while at a banquet, and extended to splenic region, where it remained. Became worse with complications till death. Autopsy: Spleen in place, undersize, contained a hard tumor larger than hen's egg, situated at the hilum, and full of knobs. Incised with difficulty and viscid gelatinous fluid came out: an ossified cystic tumor.

2. GIOVINARDI: A pathologic specimen, consisting of a cyst cretified in its walls, which he found in the spleen of a cadaver. It contained an albuminous liquid which effervesced in hydrochloric acid. Cyst was the size of a small nut.

3. J. H. HASWELL: Man, age 57, died of cancer. Fullness of left hyponchondrium noticed before death. Fluctuation. Contained on puncture small amount of whitish débris, showing microscopically fatty globules, cholesterin and a few granular red bodies. Spleen and cyst weighed 3¾ pounds. On opening, a semipultaceous matter exuded, mostly in rounded masses of a dirty yellow; among these were round, jelly-like globules, the size of a walnut, from which puncture brought a clear fluid. No hooklets or scolices were found nor any dermoid structure. Haswell calls this a mucous cyst. Almost certainly it was echinococcus.

4. BARDENHEUER: Woman, age 47, a few months previous had vivid pains in left hypochondrium. Tumor appeared and was diagnosed cyst of ovary. Bardenheuer saw patient six months after beginning of pain. Tumor in pelvis size of infant's head, pushed uterus slightly to right. Slightly movable. Diagnosed cyst of left ovary. Exploratory incision. Resection and cautery. Recovery. Contents not given.

INDICATIONS FOR THE REMOVAL OF THE PATHOLOGIC SPLEEN.*

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OMAHA, NEB.

CASE 1.—Miss S., clerk, aged 40, presented herself at the clinic of the University Medical College January 27, 1904, with the following history:

History.—Family history negative. One year ago she had German measles. Two weeks later she contracted a severe cold which lasted two weeks, and she has not felt well since. She is prone to headaches and becomes easily tired. For past six months she has complained of languor and weariness on slight exertion; also of a nausea, faintness, shortness of breath and occasional sharp pains in her left side near the costal arch. In November, 1903, she discovered an enlargement in the left upper quadrant of the abdomen extending below the arch of the ribs. She was able to continue her occupation, that of clerk in a dry goods store, until December, 1903, when she was compelled to stop it on account of the increasing muscular weakness and her inability to stoop because of pressure and soreness caused by the abdominal growth. She has never lived in a malarial district.

Examination.—She is a small woman of an anemic appearance, somewhat emaciated. A firm tumor is to be felt in the left upper quadrant extending to the median line, it moves with respiration and cannot be pushed up under the ribs. The condition excited Dr. Thomas Truelson's suspicions and he made a blood count which is recorded as follows:

Reds	3,968,000
Whites	9,600
Polynuclears (per cent.)	77
Small lymphocytes (per cent.)	17
Large lymphocytes (per cent.)	5
Eosinophiles (per cent.)	1
Hemoglobin (per cent.)	37

The heart was somewhat more rapid than normal, lungs and liver were normal. Dr. Truelson felt justified in making a diagnosis of splenic anemia and put her on medical treatment and made numerous blood counts. I am greatly indebted to Dr. Truelson for the benefit of his careful and frequent clinical records extending over a year.

In the summer of 1904 I saw her and the condition was about the same.

Later History.—Early in January, 1905, she became shorter of breath, more nauseated, had considerable rise of temperature for a period of two weeks, with pain in the region of the splenic enlargement, and distinct tenderness on pressure. The mass now became distinctly larger and was less movable than before. She also complained of increased difficulty in stooping, evidently because this caused pressure of the mass between the posterior bony wall of the abdomen and the arch of the ribs in front. For some time she had complained of a dry cough which she said seemed to be excited by a dragging or pulling sensation at the lower part of the left lung. There was no hemorrhage from the mucous membranes or diarrhea.

After she had recuperated from her febrile attack the question of splenectomy came to the fore with more force, since

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

she seemed to be losing ground and it was realized that to wait longer would only increase the risks of a successful operation.

Operation.—February 23, 1905, it was decided to send her to Immanuel Hospital for operation. The enlarged spleen at this time extended to the level of the umbilicus, and two inches to the right of the median line. The patient was more emaciated than at the beginning, weighing 95 pounds and for several months the characteristic bronzing of the skin had become more and more noticeable.

On the day of the operation the blood count was as follows:

Reds	3,936,000
Whites	15,600
Hemoglobin (per cent.)	38

The patient was operated on February 25, 1905, at Immanuel Hospital, in the presence of the students of the College of Medicine of the University of Nebraska and several visiting physicians; the spleen was removed. An eight-inch incision was made through the left rectus muscle from the ribs downward, separating the fibers of the muscle. Universal adhesions were at once apparent fixing the hypertrophied spleen to all the surrounding viscera. Remembering the unfavorable prognosis under such conditions the removal was done with the utmost caution. By ligating the vascular adhesions in two places and then cutting between the ligatures a remarkably small amount of blood was lost. The gastro-splenic ligament was treated in the same manner. Finally, by turning the spleen toward the left the vessels of the pedicle were ligated with silk, separately, and the removal was complete.

Large gauze pads wrung out of very hot water were pressed into the cavity formerly occupied by the enlarged spleen and this very soon stopped the slight oozing. The abdominal wound was closed and the patient put to bed with considerable shock, from which she soon rallied.

Result.—Her convalescence was uneventful. There was no fever and no increase in the pulse which remained almost constantly at from 80 to 84 beats a minute. She was allowed to sit up on the sixteenth day and to leave the hospital in three weeks.

Examination of Spleen.—The hypertrophied spleen was found to weigh six pounds and one ounce. It was lobulated, the edges were rounded and on the cut surface large necrotic areas presented themselves, the appearance being suggestive of sarcoma.

Subsequent History of Patient.—Very soon after the operation the patient began to gain in weight and the last I heard from her, May 25, three months after the operation, she wrote that she had gained 25 pounds. Her faintness, shortness of breath, muscular weakness, etc., have been steadily less marked. The bronzing of the skin began soon to disappear and when she left Omaha, two months after the operation, her skin had lost all trace of it.

A leucocyte count the day following operation showed 27,000 leucocytes. The further detailed report will be published by Dr. Thomas Truelson, who has worked out the clinical and pathologic data in the most thorough manner, to whom I wish to express my thanks.

FUNCTIONS OF THE SPLEEN.

Until the physiology of an organ is known its pathology is likely to be elusive. On the other hand, a study of its pathology is often rewarded by a clearer knowledge of its physiology.

Regarding the function of the spleen about all that can be definitely stated is that it belongs to the hematopoietic system. The exact nature of its function is yet conjectural. That it manufactures white blood corpuscles, that it breaks up and destroys the reds, and that the splenic cells liberate hemoglobin, which passing to the liver is there transformed into bile pigment, are some of the functions commonly associated with the spleen.

That all these functions are performed by the spleen, in the light of recent observations, is inconceivable. Against the time-honored opinion that the lymphoid tissue of the spleen manufactures white blood corpuscles and destroys the reds is the undisputed fact that during the first few days after the spleen has been removed the number of leucocytes increases more than 100 per cent., while the number of red blood corpuscles is considerably diminished.

If a factory having almost a monopoly in the manufacture of a certain commodity be burned, there would scarcely be likely to be an immediate increase of that article on the market. The logical deduction is that instead of elaborating white blood corpuscles the spleen destroys them, and the decrease in the reds points to the spleen as their manufacturer—not as the place of their destruction.

These deductions support the opinion of Vulpius that the spleen transforms the whites into reds. Vulpius reached this conclusion by observing that when the spleen is congested by natural or artificial means the blood habitually contains a maximum number of reds and a minimum number of whites.

Williamson[1] found that by a special method of staining he was invariably able to determine nucleated red blood-cells, many of them in a state of nuclear division, in spleen smears of hogs and cattle. The same observation had previously been made by Arteaga,[2] of Havana, using the spleens of cats and dogs. In fact, most of the experiments of recent years lend support to the opinion that in vertebrates the function of the spleen is the manufacture of red blood corpuscles.

That the spleen is an important elaborator of the blood directly or through the medium of an internal secretion which performs that function is further proved by the well-known fact that an acute anemia caused by hemorrhage is always followed by a temporary enlargement of the spleen, due no doubt to an extra amount of work being thrown on it in an effort to make good the loss. If its function was to destroy red blood corpuscles and to elaborate leucocytes would there be need of an increase of its function?

If we adhere to the orthodox opinions, the opinions laid down by the text-books on physiology, we would *a priori* expect splenectomy to induce immediately a great decrease of the whites and an increase of the reds, a phenomenon directly the opposite of that universally observed. Continued careful observations of the blood changes in pathologic conditions of the spleen, as well as of the condition of the blood after splenectomy, are likely to place the physiology of this organ on a securer basis than the purely speculative one of the physiologists.

One of the most attractive fields for physiologic research is along the lines of the internal secretions. It is not necessary to believe that all the influence the spleen exerts is carried out within the organ itself. A toxin or toxins may be elaborated by the splenic cells, which, passing into the circulation, may exert a profound influence over the elaboration of the blood. Although certain blood changes may, and probably do, occur within the spleen, they may be of only minor importance. The major function may be the production of a powerful chemical agent which is projected into the circulation and does its work within the vascular system.

SPLENECTOMY.

In the history of the development of splenectomy as a surgical procedure numerous mistakes have been

1. Williamson: Amer. Med., June 3, 1905.
2. Arteaga: Amer. Med., May 14, 1904.

made. Ignorance of its physiology has led to much blind groping to learn something of the pathology. Many spleens have been removed that should not have been treated surgically and many fatalities are to be charged to insufficient knowledge of the limitations of splenectomy as a curative measure.

The border lines between the conditions that may be dealt with surgically and those to be left untouched are becoming better defined though not yet as definite as would be wished. Every item that may aid in increasing the knowledge of the physiology and pathology of this organ, as well as to clear up points in diagnosis is of the greatest value. Unfortunately, the blood-findings before and after splenectomy have been completely recorded in only a few instances.

The discussion of the immediate and remote results of removal of the spleen has been so largely entered into and so recently by such men as Warren,[3] Harris,[4] Bessel-Hagen[5] and many others that it will be passed over briefly. A few well worked out facts may be enumerated. Almost without variation, splenectomy is followed by a marked leucocytosis, the number of leucocytes increasing daily until the maximum is attained in from ten days to three weeks, when there is a gradual diminution and in from four to six months they reach normal again.

The number of red cells, on the contrary, is diminished though in a less proportion and normal is not usually reached until six months or more after the spleen has been removed. These facts seem to show that although the function of the spleen may be performed by other tissues, this vicarious power is gained very slowly.

There is also a decrease in the amount of hemoglobin following the splenectomy. This decrease is not dependent on the loss of blood during the operation. There has also been found to be a permanent increase in the eosinophiles in all observed cases.

In a number of observations the lymph glands have been found considerably enlarged within a short time after the spleen has been removed, an enlargement which did not exist before operation.

The marrow of the bones is found to be denser and a deeper red, and complaint has occasionally been made by patients of an aching sensation in the long bones the first few days after loss of the spleen.

The condition of the blood, in most of the cases observed that long, has been found to have reached normal in six months after the operation and the restoration to health has been complete and permanent as far as observations have been made.

Theoretically, it was supposed that loss of the spleen would lower resistance to infection. Blumreich and Jacoby[6] have proved that a splenectomized animal has as much resistance to infection with bacteria or toxins as if a spleen were present. No observation has been made of any human subjects showing greater susceptibility to infection after splenectomy than before.

MORTALITY FROM SPLENECTOMY.

Having shown that the loss of the spleen is not incompatible with the continuance of life and good health it will be of interest to notice briefly the mortality from the operation. As in the development of all operations, the mortality from the earlier operations is much higher than it should be. Many spleens have been removed that no one would think of removing now. There are certain absolute contraindications to the operation, of which leukemia, atrophic cirrhosis of the liver and amyloid spleen are the chief. Some have considered dense adhesions to the surrounding viscera a contraindication, but the question of when such spleens are to be removed is largely a personal one and will depend on individual experience.

From all I can gather from a fairly close scrutiny of the literature I believe the present mortality of splenectomy for all appropriate conditions to be not more than from 15 to 18 per cent. Bessel-Hagen[5] even considers the mortality when there is a real reason for splenectomy to be only 12.2 per cent. When it is remembered that the mortality in these cases before 1890 was probably over 50 per cent., it shows flattering improvement. Perfection of the technic, a more judicious selection of cases and operation at a more favorable period have brought about this lower mortality and will doubtless produce still greater reduction as experience increases.

INDICATIONS FOR SPLENECTOMY.

Given then the proper indications, splenectomy is a proper operation. Its mortality is still sufficiently high to be prohibitive except for a condition incurable by any other method of treatment, or so troublesome that the patient is willing to run a considerable risk for the sake of being rid of his suffering.

In echinococcus or other cysts of the spleen, its removal is practically the only choice, except when adhesions to the abdominal wall, the diaphragm or the abdominal viscera are so great that the mortality would be prohibitive. In such cases, drainage with marsupialization of the cyst cavity has proved satisfactory, though the period of convalescence is likely to be tedious and uncertain.

Cases of abscess of the spleen must be judged on their merits. It certainly would not be good surgery to sacrifice the entire organ, if drainage would do as well. In cases of perisplenic abscess thorough drainage is in most cases the procedure to be preferred. The same may be said of a single abscess contained within the spleen, if the greater part of the splenic tissue be intact. In multiple abscesses, or when an abscess is very large and a great part of the spleen is infected or destroyed, doubtless better and safer results will be attained by entire removal of the organ.

In tuberculosis, if the organ be extensively invaded, splenectomy is the only treatment that will prove satisfactory. In those rare cases in which only the lower extremity is invaded by the tubercles resection well beyond the disease seems to be the operation of choice.

In sarcoma, an early splenectomy may prove curative, but most of the operations are likely to be so late that an early recurrence will be the rule. Exploratory operation as soon as there is a definite suspicion of sarcoma is the only treatment which gives promise of benefiting this class of patients.

TRAUMATIC RUPTURE OF THE SPLEEN.

The most constant symptoms of splenic rupture are collapse from hemorrhage, rigidity of the abdominal muscles on the left side and the occurrence of dullness in the left upper quadrant and the left flank if the hemorrhage is extreme.

Makins, in 292 cases of injury of the abdominal viscera, found rupture of the spleen in 30 per cent. of them, which proves it to be far from rare.

3. Warren: Annals of Surg., May, 1901.
4. Harris: Annals of Surg., July, 1901.
5. Bessel-Hagen: Arch. f. klin. Chirurgie, lxii, 1900.
6. Blumreich and Jacoby: Zeits. f. Hygiene, xxix, 1898.

A blow or wound in the splenic area followed by symptoms indicative of severe internal hemorrhage should excite a suspicion of rupture or wound of the spleen and an immediate abdominal section should be done. The course to be pursued will be determined by the conditions found. Splenectomy, suture of the rent, and tamponade each has its place, and on the judgment displayed in selecting the proper procedure much depends.

Death following rupture of the spleen is almost always due to hemorrhage, though it may be due to peritonitis, especially if it is caused by a penetrating wound. Edler[7] states that injuries of the spleen are fatal in 76.6 per cent. of the cases when no operation is done, while Lewerenz[8] claims that the mortality is 85 per cent. In 50 cases of ruptured spleen recorded by Eisendrath[9] in which laparotomy was performed, 28 patients recovered—a very forcible argument in favor of operation. One should not wait for recovery from the collapse, since the hemorrhage is continuous, and if the injury is serious the collapse will become more profound until death supervenes. It is an operation of emergency and should be done at the earliest possible moment. If the diagnosis is not absolutely convincing, it is much more dangerous to wait than to operate when the symptoms point definitely toward an injury in the left upper quadrant. If not the spleen, in all probability some other viscus needs attention.

When the abdomen has been opened and the spleen examined, a decision for or against splenectomy must depend on the extent and character of the injury and the possibility of controlling the hemorrhage by means of suture or tamponade. In general, if the injury is cortical and on the convex border well away from the arteries, not very extensive, and there is not too much pulpification of the splenic tissue, a well-placed tampon may control the hemorrhage. If it is determined to test the effect of tamponade, the operation should not be concluded until the tampon is found to be effective. If the hemorrhage is not checked by this means, the spleen should be removed at once before any more blood is lost. It is only very rarely that suture will be of benefit. The splenic tissue is so friable that the sutures cut out and the hemorrhage is likely to be made worse.

If the injury is a severe one to the lower extremity of the organ and the remainder is intact, a partial excision may be practiced, if the patient is not already too much exsanguinated.

If the injury is extensive and the hemorrhage extreme, splenectomy will be followed by the best results. Warren[3] records 34 cases of splenectomy for ruptured spleen since 1890, with a mortality of 41.2 per cent. Senn[10] says that ligation of the splenic artery will control the hemorrhage, but is followed by death due to toxemia, a poison being produced in the spleen which finds its way to the peritoneal cavity, where it is absorbed with fatal results.

Another important factor which should be taken into consideration in dealing with a ruptured spleen is that the pathologic spleen is easily injured. Lewerenz[8] found that of 131 cases of ruptured spleen, 82 occurred in previously pathologic organs. Such a spleen should be removed for slighter injuries than if the organ was previously sound.

7. Edler: Arch. f. klin. Chirurgie, xxxiv.
8. Lewerenz: Arch. f. klin. Chirurgie, lx, 1900.
9. Eisendrath: Annals of Surg., December, 1902.
10. Senn: THE JOURNAL A. M. A., Nov. 21, 1903.

WANDERING SPLEEN.

There are always two important questions in connection with wandering spleen: 1. Does the condition produce sufficient symptoms to demand any surgical intervention? 2. If so, shall splenopexy or splenectomy be done? In answer to the first question, no report has been made of wandering spleen, in which the symptoms have not been so distressing that operation was practically imperative.

To the second question, the answer is not so simple. The natural conclusion is that splenopexy is the safer and more conservative operation.

The facts seem to be that the idiopathic wandering spleen is of the greatest rarity and it is usually caused by hypertrophy. With this understanding of the rationale of wandering spleen, there seems the narrowest conceivable field for splenopexy.

If sufficient splenic hypertrophy is present to have stretched the ligaments and dragged the organ away from its moorings, splenopexy will not hold the heavy pathologic gland in its normal position, and if it did the primary disease would not be cured. It might be said that almost all hypertrophied spleens are wandering spleens within certain limits. The rational treatment here would be to perform splenectomy if the spleen be affected by a form of hypertrophy which is curable by this means, otherwise to let it alone.

There is one exception to the rule that a wandering spleen was a hypertrophied spleen before it began to wander. It is that rather large class of cases in which a general splanchnoptosis exists, the wandering spleen being simply an incident and certainly not to be treated by splenopexy, unless in conjunction with fixation of other viscera.

The mortality of splenectomy for wandering spleen is fortunately low. Warren[3] collects 43 splenectomies in ten years for this condition, with only three deaths, or only 7 per cent.

Wandering spleens have frequently been mistaken for ovarian cysts, uterine fibroids and movable kidneys.

MALARIAL SPLEEN.

Most writers on the surgery of the spleen previous to 1890 condemn splenectomy for malarial hypertrophy. In most cases, successful treatment of the malaria is followed by a gradual involution of the hypertrophied spleen until it reaches normal. It is not always possible, however, to attain this result, and antimalarial medication is fruitless so long as the spleen is retained, but is easily cured after removal of that organ.

Laveran states that the spleen does not protect against malaria, as has sometimes been asserted, but is a receptacle and habitat of the malarial organism. Jonnesco[11] is of the opinion that the removal of the spleen from a patient suffering from malaria cures the malaria by removing the breeding place of the organism. This seems reasonable and the results of splenectomy of the malarial spleen bear out Jonnesco's statement.

Bessel-Hagen[5] has collected records of 88 splenectomies for malarial spleen. Of this number, 24 were done prior to 1891, with 15 deaths, a mortality of 62.5 per cent.; 64 occurred between 1891 and 1900, with 15 deaths, a mortality of 23.4 per cent. A decrease in mortality from 62.5 per cent. to 23.4 per cent. in a single decade goes far to explain the change of opinion of surgeons relative to splenectomy for this condition.

Caution is needful not to subject patients to splenec-

11. Jonnesco: Gazette des Hopitaux, lxxi, 1898.

tomy for malarial spleen, unless the condition positively can not be relieved by medical means, but the operation should not be delayed until ascites is present.

The size of the malarial spleen does not seem to be a factor affecting the mortality, as the largest spleens have been removed with no higher mortality than those of moderate dimensions.

SPLENIC ANEMIA.

There seems to be considerable confusion in the nomenclature of the disease characterized by primary splenic hypertrophy, a decrease in the number of red blood corpuscles, a slight leucopenia, with progressive weakness, hemorrhages from the mucous membranes, vomiting, diarrhea, bronzing of the skin and death in a period varying from six months in the more rapid cases to ten or fifteen years in the slower ones. All these cases, so far as I can determine, are later complicated by hypertrophy of the liver—not always a true cirrhosis—ascites, and all the syndromes described by Banti[12] in his classical paper. Splenic anemia, primary splenomegaly, splenic pseudoleukemia and Banti's disease are doubtless one and the same, masquerading under different names.

This statement seems called for, because of a tendency on the part of some writers to refer to primary splenomegaly, splenic anemia and Banti's disease as three separate and distinct entities. Primary cirrhosis of the liver, with secondary hypertrophy of the spleen, should not be confounded with splenic anemia; neither should any confusion remain regarding splenic leukemia, which stands by itself, being characterized by a marked decrease in the reds and an immense increase of the whites. Even here it is not correct to say that if the proportion of whites to reds is 1-50 it proves the disease to be splenic leukemia and otherwise not. Osler[13] reports a case of true splenic leukemia in which for a protracted period the number of white blood cells was normal, and Murrell[14] states that often the number of leucocytes in splenic leukemia remains normal or nearly normal much of the time. The one test in these cases seems to be the presence of myelocytes, which always proves it to be splenic leukemia.

The following question is of the utmost practical importance: Is splenic anemia a primary disease of the spleen and are the blood changes and other symptoms secondary, or is the splenomegaly merely an incident to a general disease, or is it secondary to the blood changes? Osler[13] takes the ground that the enlarged spleen and the changes in the blood are both produced by the same general condition. If this were the case, it would not be logical to suppose that the removal of the spleen would bring restoration to health. The fact that this does occur has been definitely proved by hundreds of cases.

The views of Sippy[15] seem more nearly to conform to the known facts. He believes the disease of the spleen to be the primary pathologic entity and the blood changes, *et cetera*, to be the product of the splenic pathology.

Whether the anemia is produced by failure of the diseased spleen to elaborate red blood cells, assuming this to be its function, is not proved, but seems probable. Possibly chemical agents are elaborated in the pathologic spleen, which, either in the gland, or after they gain access to the circulating blood, inhibit the production of red blood corpuscles or cause their dissolution and thus induce anemia.

This might be determined by injecting the filtrate of the pulp of a hypertrophied spleen into the circulation of animals. The only experiment of this kind I know of was that of Sippy,[15] but the rabbit unfortunately died too soon to show blood changes. This opens up the possibility of some interesting research along this line, a dose being ascertained that will prove or disprove the existence of a poison inimical to the existence of red blood cells, without being fatal to the test animal.

The cause underlying the hypertrophy of the spleen is not easy to determine. Barr considers it due to a vasomotor paresis of the splanchnic area, arising from disease of the visceral sympathetic ganglia, a theory not proved, but possessing the merit of not being easily disproved.

In the absence of any rational explanation, it becomes necessary to accept the conditions without being able to explain the rationale on which they are based.

The fact that removal of the diseased spleen is usually followed by a still greater diminution of the red blood cells would argue that the pathologic organ, though not possessing its physiologic activity, is not by any means functionless, or there would be no further reduction in the number of reds after splenectomy.

The diagnosis of splenic anemia, if errors would be avoided, should be reached by the greatest care in getting all the facts and eliminating sources of errors. As has been shown by the experience of Osler[13] and Murrell,[14] a case of leukemia during one of those periods when the number of leucocytes is normal, by a careless observer, might be diagnosticated splenic anemia. The presence of myelocytes ought to prevent such an error.

The congested spleen caused by cirrhosis of the liver ought to be recognized from the history and the condition of the liver, though there is not always any material difference in the blood changes. The spleen enlarged secondarily to liver cirrhosis is not nearly so large as the spleen of primary splenomegaly. In liver cirrhosis secondary to splenic anemia, and explained by Banti as due to a toxemia, the products of which passing through the liver cause hyperplasia of the connective tissue such as is found in alcoholics, comes late in the disease, the enlargement of the spleen having existed for months or years before the hepatic condition.

In the amyloid spleen a secondary anemia is always present and the patient's general condition and history ought to prevent mistakes if one is careful.

In malarial spleen, the history is of the greatest value in avoiding diagnostic error.

In splenic anemia, the red blood corpuscles are not greatly reduced in number as a rule. Probably in the majority of cases they will range from 2,500,000 to 4,000,000 in the c. mm., though they may be reduced as low as 1,500,000 or go as high as 5,000,000.

The whites are usually somewhat less than normal. A decided leucocytosis should produce a suspicion that it is not splenic anemia, or one should look for some coincident or accidental cause for the leucocytosis.

The hemoglobin is usually very low and the color index much less than normal.

In pernicious anemia the spleen will be found only moderately enlarged, the reds lower than usually found in splenic anemia. Myelocytes are found in more than

12. Banti: Berliner klin. Wochft., 1886.
13. Osler: Amer. Jour. of Med. Sci., January, 1900.
14. Murrell: Medical Manual, 1904.
15. Sippy: Amer. Jour. of Med. Sci., October and November, 1899.

half the cases of pernicious anemia, as shown by Cabot's[16] table.

The details of arriving at a correct diagnosis are given so fully by several recent writers that nothing more need be said on this point, except to urge that when a suspicion is aroused of the existence of this disease no detail should be omitted in trying to arrive at a correct diagnosis as soon as possible. The only treatment is surgical, and the sooner the spleen is removed the better will it be for the patient. When early operation becomes the rule, before the patient becomes too greatly reduced by the ravages of the disease, the lower will be the mortality.

SUMMARY OF THE MAIN POINTS DISCUSSED.

1. The more probable function of the spleen is the manufacture of red blood corpuscles, with a strong probability of the existence of an internal secretion which is of value in maintaining the proper relative proportion of the elements of the blood.

2. Splenectomy is contraindicated in leukemia, amyloid spleen, splenic hypertrophy secondary to cirrhosis of the liver, secondary malignant disease and in the essential anemias.

3. Splenectomy is usually preferable to splenopexy in wandering spleen, which is almost always due to previous hypertrophy.

4. In abscess of the spleen, if drainage can be successfully accomplished, it is preferable to splenectomy, especially if the splenic tissue is not destroyed.

5. In cysts, benign tumors, tuberculosis and sarcoma, splenectomy is the operation of choice, unless in the three former conditions resection of the lower extremity will remove all of the disease.

6. In rupture, the organ should usually be removed. The operation should be done promptly, expeditiously, and with every expedient calculated to relieve and to prevent shock.

7. In the severe type of malarial spleen, with failure of any relief of the malaria or the extreme splenic enlargement by medical means, splenectomy will often result in cure.

8. In splenic anemia, internal medication has proven futile. The only treatment that should be considered is splenectomy, which should be done at as early a period as possible while the patient is able to withstand the operation and before incurable complications have arisen.

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16. Cabot: Clinical Examination of the Blood.

DISCUSSION

ON PAPERS BY DRS. BRYAN AND DAVIS.

DR. M. L. HARRIS, Chicago, said that one of the most interesting and important conditions which has recently been taken from the hands of the internist and transferred to the surgeon is that of splenic anemia or so-called splenomegaly. Proper blood examinations made before and after splenectomy show that the primary condition is probably in the spleen. In all of these cases, before operation, we find that there has been a destruction of the blood cells—excessive hemolysis. He did not agree with the statement that the experiments show, or tend to show that the spleen in splenic anemia produces red blood cells. Immediately after the removal of the spleen in these cases there is a marked increase in the number of red blood cells, which would show that the red blood cells are not produced by the spleen. In two cases in which he operated for the removal of the spleen, within twenty-four hours thereafter, there was an increase in the number of red blood cells of from 25 to 40 per cent. and in one case there was an increase in the whites of 800 per cent. If these figures show anything it is that the spleen had destroyed both the red and white cells. The fact that there is always a diminished number of red blood cells, and that these cells, after the removal of the spleen, return to their normal number and remain there would indicate that in the enlarged spleen there had been excessive hemolysis. Whatever the function of the spleen may be in regard to blood formation or blood destruction, however, it is not an essential function, because patients live and maintain perfect health after the spleen has been removed. The one feature in the composition of the blood which seems to be permanent and constant after the removal of the spleen is a marked increase in the percentage of the eosinophiles. Whether the spleen has been removed experimentally or for pathologic reasons there has occurred an increase in the eosinophiles often to a remarkable extent and this increase has been permanent. It is now more than six years since Dr. Harris first removed the spleen for splenic anemia, and he has made repeated examinations of the patient's blood every three or four months since. The eosinophiles have increased to 15 per cent. and the percentage has returned to the normal and remained so. The eosinophiles are very marked and pronounced, the granules are extremely large, and they take the stain very brilliantly. This, Dr. Harris said, is the only permanent and marked change that we have been able to discover in the blood after splenectomy.

DR. CHARLES A. POWERS, Denver, declared that he has recently investigated the subject of cysts of the spleen and he agreed with Dr. Bryan that non-parasitic cysts of this organ are of a sero-sanguineous type and generally sub-capsular. The hemorrhages increase from time to time, and often extend over several years. Less frequently the hemorrhages are sub-peritoneal, at times they may be parenchymatous. In his case, the patient, a young man of 18, who was sent to me from Manitou, was operated on in 1895. He had an enormous left-sided abdominal tumor extending from the diaphragm to the pelvis and over to the right side. After care-

ful examination Dr. Powers decided that it was probably a splenic cyst and operated. The wall of the cyst was densely adherent everywhere to the abdominal wall, and extirpation was impossible. Through drainage was made; the walls proved to be semi-fibrous. The cavity did not shrink, septic absorption took place from the cyst wall, and the patient died on the twelfth day. Autopsy showed the growth to be impossible of extirpation. In his search of the literature he discovered 32 of these cases, of which 28 were available for study. Of these 28 patients 3 were treated by puncture, 2 by incision and injection, 5 by extirpation of the cyst and 10 by splenectomy. Of these various procedures the only one which proved satisfactory was splenectomy: all of the ten patients so operated on recovered. Splenectomy then, is the operation of choice when it is possible.

DR. R. E. SCHLUETER, St. Louis, mentioned a case of traumatic rupture of the spleen which he saw ten hours after the injury. The spleen had been completely cut in two and on opening the abdomen the two halves could be seen distinctly separated. The patient was a boy, aged 14. The abdomen was opened in the median line and by forcible traction on the belly wall the spleen was easily removed. The hemorrhage was completely arrested before the operation and the boy apparently recovered from the shock. Subsequent to the removal a slight enlargement of all the lymphatic glands of the body was noticed, and also a leucocytosis which never went above 20,000.*

DR. A. H. CORDIER, Kansas City, said that it was important to know if the disease is primary or if it is a secondary manifestation of some disease in another part of the body. He mentioned the case of a man, aged 21, who had had jaundice for 19 years. Dr. Cordier did a cholecystenterostomy at which time he noticed that the liver was very much enlarged and changed, and that the spleen also was enlarged. The patient's billiary symptoms were relieved, but owing to the changes that had taken place in the liver and spleen Dr. Cordier was afraid the results might not be permanent. A year and a half later the man returned with a typical case of splenic anemia. The liver was very much contracted. There is a class of cases occurring in drinking individuals in which there is an enlargement of the spleen, and surgeons must be very careful in their choice of operation. It is a fact that in all of these cases in which there is a contraction of the liver or the spleen there is very rarely ascites accompanying it. Enlargements of the spleen seem to be conservative in a measure, in such cases. Careful diagnosis before operation is very important in order to obtain satisfactory results.

DR. H. G. MARXMILLER, Cincinnati, said that the subject should be divided into two parts, surgical spleens and medical spleens, and it behooves surgeons to be positive in their diagnoses before endeavoring to remove spleens that are only apparently surgical. It has been his good fortune, or misfortune, to see this operation done by many good men where simple hypertrophy of the spleen has been diagnosed as some other condition, such as Banti's disease, splenic anemia, etc. If one will take a dried specimen of the blood and properly stain it the condition of the blood can readily be brought out, and the presence or absence of leucocytes or myelocytes or eosinophiles should caution the surgeon as to the removal of the spleen. Perhaps in a few instances the spleen can be removed with good results. Splenectomy for leukemia and allied conditions has given a mortality of almost 100 per cent. and we should not be quite so bold in the removal of these spleens. Senn, Dock and others have reported cases of splenic anemia that sometimes follow protracted cases of typhoid and malaria, in which complete recovery has followed the use of the *x*-ray. Dr. Maxmiller has had under observation for several years a case of chronic myelogenous leukemia. When he first saw the case, the patient had all the symptoms of splenic enlargement. The spleen reached to the brim of the pelvis and increased the abdominal circumference by eight or nine inches. Although operation had been recommended it would have been folly to have removed this spleen. The presence of the subcutaneous extravasation of blood and the approach of the fatal termination was almost apparent. This case was controlled by the internal medication of adrenalin chlorid, 1-1000 in thirty minim doses, four times daily, and the application of *x*-ray directed to the splenic substance. The spleen has been reduced almost to its normal size and the patient has continued up to the present time in good health. Cases have been reported in which even in simple anemia, with hypertrophied spleen, splenectomy has been done, and following this death has occurred from hemorrhage, patients succumbing within a period of from three to seven days following operation. A thorough diagnosis must first be made and then an endeavor to relieve these conditions by other methods before attempting splenectomy.

DR. MCDANIELS, San Antonio, reported the case of a woman from whom he removed the spleen six years ago and who has since borne children and remained well.

DR. W. JEPSON, Sioux City, Iowa, said that in considering affections of the spleen from the standpoint of the necessity of removal of that organ, he thinks these can be classified under several headings. First, those affections which are primarily of this organ, as for example; sarcoma, carcinoma, various forms of cysts, tuberculosis and miliary abscesses. Under this heading may also be classed injuries and displacements of the spleen. Second, affections of the spleen which are secondary to pathologic processes located elsewhere in the economy, as for example: the splenomegalies of malaria, leukemia, splenic leukemia, etc. The first class of cases cited demand splenectomy because the pathologic process can not be otherwise satisfactorily dealt with. In the second class of cases, in which the splenomegaly is secondary to a primary process located elsewhere, splenectomy can hardly, in his opinion, be justified, except on the ground that the spleen is of such a size as seriously to impair the function of other intra-abdominal viscera. As an ovarian cyst or other intra-abdominal tumor, by reason of its size, may jeopardize the life of the patient, so in a similar manner may the enlarged spleen threaten health and life and when such is the case it would constitute a just reason for its removal. As our knowledge of the spleen is not definite, it would seem that care should be exercised against sacrificing this organ unless the indications for so doing are very clear, even though a large list of splenectomies show apparently perfect health after. Dr. Jepson said that in one splenectomy the blood changes consisted of a fall of red corpuscles from above 5,000,000 before the operation to 3,300,000 the day following the operation and it was only after three weeks that the number reached approximately 4,500,000. During this time the whites increased from 6,000 to 27,000. In another case of splenectomy, in a case of Banti's disease, the blood changes were somewhat similar as regards the red corpuscles but he could not recall with certainty the exact changes. He had interpreted the diminished number of red corpuscles as possibly being due to blood loss which, however, was slight in each case.

DR. JEFFERSON D. GRIFFITH, Kansas City, stated that he has operated in several of these. One operation was for hernia of the spleen in a child six years old. The spleen had escaped, following a severe attack of whooping cough, and when the child was brought to him he did not know what was the matter. There apparently had been very few symptoms other than fretfulness. On cutting down he encountered a large body which proved to be the spleen. It was lying well down and was not strangulated. After ligating the vessels he took it away; the child made an uneventful recovery. The parents have since told him that the child's whole disposition has changed. The case occurred ten years ago and in the meantime the child's disposition and temperament, which before the operation were phlegmatic, have now grown to be rather nervous and vicious.

DR. W. A. BRYAN said that he has appended to his paper a list of the cases that he has been able to collect of non-parasitic cysts. There was one of dermoid, 12 of cysts classified as simple or serous, 24 of cysts classified as hematic or blood, and 4 that were not definitely classified. There are 41 cases of non-parasitic cysts of the spleen so far recorded, but

* A report of this case was published in the Journal of the Missouri Medical Association, July, 1905.

only 12 have been classified as simple. If these 12 could be analyzed it would be found that many of them should be classified with the blood cysts. Simple serous cysts are exceedingly rare. The danger of splenectomy is a great deal larger in those cases in which the spleen is functionating than it is when the function has disappeared. In the case reported by Dr. Bryan the cyst and spleen together weighed two and a half pounds, but there was not more than one and a half ounces of real spleen tissue.

DR. B. B. DAVIS stated that he has looked over the literature on removal of the spleen and in practically all the cases of splenectomy done on animals for experimental purposes and cases of splenectomy done for rupture, the operation has been universally followed by a decrease in the reds. In the few cases in which splenectomy has been followed by an increase in the reds there has been some reason for it. In a case reported by Harris some years ago the condition had been present for years. In such cases Dr. Davis believes that the vicarious function carried on by the bone marrow becomes established and this affects the blood formation. He said that if Dr. Harris will look up the literature he will find that it will bear out the statement that the removal of the spleen does reduce the number of red blood cells. The very fact that in these cases, in which there has been a careful study beforehand, the removal of the spleen has been followed by restoration to health shows that the splenomegaly is the primary lesion. It will not be possible to put this class of cases along with the case of which Dr. Jepson spoke. In primary splenomegaly there is a secondary cirrhosis of the liver, and ascites. Operation should be done in these cases before these complications arise, as the patients are very likely not to be helped by the operation.

ACID INTOXICATION, AND LATE POISONOUS EFFECTS OF ANESTHETICS.

HEPATIC TOXEMIA. ACUTE FATTY DEGENERATION OF THE LIVER FOLLOWING CHLOROFORM AND ETHER ANESTHESIA.*

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AND

HENRY BAIRD FAVILL, M.D.,

CHICAGO.

In January, 1905, there occurred in our practice a case of gangrenous ovarian cyst with twisted pedicle. The patient was operated on and the case terminated fatally four days and a half later. The clinical picture was a very unusual one. Although we were aided in the conduct of the case by four consultants, a gynecologist, an internist, a neurologist, and a pathologist of more than ordinary ability, no definite diagnosis of the cause of the singular symptoms could be made. The parents of the child, fortunately, were intelligent and considerate and, realizing the importance to humanity and to science of ascertaining the exact cause of death, as the first step to the prevention of a similar result in other cases, permitted a postmortem examination. This was made with the greatest thoroughness, gross, microscopic and bacteriologic, and yet even then the cause of death was obscure and remained so until a careful review of the literature enabled us to collect twenty-nine more or less scattered cases, either identical or very similar to our own, in the light of which we believe the diagnosis becomes clear. We have found also certain comparatively recent experimental work reported, which assists materially in the understanding of the case.

DR. FAVILL'S REPORT OF CASE.

We shall cite first the outline of our experience, which it seems worth while to report, first, because of its essential importance as a positive clinical picture; second, because of its value with respect to negative demonstrations.

Patient.—A girl, aged 12½ years, with the stature of a woman and the mental development of a girl of 16 or 18. Not at all a "freak," but simply a noticeably handsome, well-developed and intelligent girl. She menstruated at the age of 11½ and was reasonably regular thereafter.

History.—Her history as to illness is negative. At 3 she had an acute otitis media which was treated by puncture, under chloroform, and recovered promptly and permanently; since that time no illness of any consequence, though she was of a lithemic type.

January 17: She came home from skating, complaining of great pain in the lower abdomen. Her menstruation being due, though it was habitually painless, her pain was ascribed to that fact. The pain was very severe. When seen two hours later it was somewhat less, but still severe. Temperature, 98.4; pulse, 72; general abdominal tenderness, but absolutely no local increase. The appendix was excluded and the conclusion as to premenstrual pain adopted. Some whiskey was given her, which she vomited.

A nurse was called; the child was covered with a flaxseed poultice on the lower abdomen, given small doses of phenacetin at intervals and saline cathartics.

January 18: In the morning her temperature was normal, but she was still in some pain. Temperature in the evening was 99. She had a comfortable day and began to menstruate at 11 p. m.

January 19: Thursday was an uneventful day; very little pain, no abdominal distension and very little tenderness; the bowels moved twice slightly; temperature at 5 p. m. was 99. She vomited some orange juice at noon; she was cheerful and feeling well, however.

January 20: Friday she was still in pain; temperature, 100.5. Inasmuch as the menstrual conditions did not seem to justify any increase of symptoms, suspicion was aroused; a blood count showed 11,600 leucocytes. Dr. Bevan was called in consultation. Temperature gradually rose and slight tenderness developed in the neighborhood of the appendix. At 2 o'clock the temperature was 102.2, leucocytes 14,000. Free bowel movement. At 9 p. m. the temperature was 102.6, pulse 108, leucocytes 16,500. Dr. Webster was called in consultation.

A diagnosis of appendicitis was fully agreed on and an operation was performed about midnight.

Previous to the operation a thorough pelvic examination was made bi-manually by rectum, but no palpable abnormality was found.

Operation.—The operation was performed under chloroform, and it is noteworthy that it took a long time and an unusually large amount of chloroform to establish anesthesia. The exact amount of chloroform, however, was not noted at the time, but it is clear that in both respects the anesthesia was noticeable.

Because of some rather definite sense of resistance under the right rectus muscle, just above the pubes, the incision was made through the right rectus. The peritoneal cavity was opened and the appendix was found injected and buried in lymph directly under the incision. It was removed and the stump invaginated in the ordinary way. On separating the coils of intestines which surrounded the appendix, a black mass was seen. At first glance this was thought to be a gangrenous bowel, but on separating the intestines a gangrenous ovarian cyst and tube of the left side were brought into view. The intestines in contact with the mass were covered with a thin layer of lymph. There was no pus. The pedicle was ligated proximally to the point of torsion and the dead mass removed; the abdomen was closed without drainage. No time was lost in any way, and although the exact time was not noted, the operation was a rather short one.

Postoperative History.—From the time of operation till death, the dressings were not removed from the wound. The abdomen was flat, soft and painless, and there were absolutely no evidences of peritonitis.

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

The patient was returned to bed in excellent condition; temperature 101.6, pulse 102, and thoroughly conscious at 1:45 a. m. The succeeding hours were unusually comfortable. The temperature steadily fell until Saturday at 11 a. m., when it was 99.8; pulse 86; respiration 23, and leucocytes 12,000. The patient had a very comfortable day; temperature 101.2 at 4 p. m.; she vomited a trifle at 7 p. m., and flatus was expelled freely.

January 22: Sunday, at 8 a. m., the temperature was 98.6; pulse 100. She slept more or less during the night, vomited a little and passed several slight stools. She complained of feeling hungry. She continued in this comfortable way all day Sunday. At 7 p. m. temperature was 99.2, pulse having risen to 112, and the mother noticed that the patient was not quite natural in her remarks. The attention of the physicians was called to this point, but the incident was so slight as to seem unimportant to them. At 11 p. m. the physicians were again called. The child was talking incoherently and exhibiting evidences of very great fright.

The picture of this mental condition is so unusual and from comparison with the experiences of others so typical that we venture to dilate on it. First, its appearance almost out of a clear sky. The child had been phenomenally favorable in her progress until forty-four hours after the operation. Second, the element of fright as the initial manifestation. Third, the rapid lapse into incoherence and unremitting delirium. Her first noticeable departure from the normal was at 8 p. m. on Sunday, and at 11 p. m. she gave the last obvious recognition of anybody. From that time on it was a series of alternations between sleep and delirium, more or less talkative, with a curious shrieking outcry. The delirium was controllable to a certain extent by small amounts of morphin hypodermatically, but except for that nothing seemed to affect her condition.

Consultation with Dr. Patrick.—Of course, the question of septic meningitis arose immediately. At noon on Monday, January 23, Dr. Patrick was invited into consultation. At that time there were present the following significant signs: Considerable muscular rigidity, exaggerated tendon reflexes, particularly patellar, ankle clonus and a perfectly marked Babinsky's reaction. Nevertheless, the consultation did not result in a clear diagnosis of meningitis.

Dr. Hugh T. Patrick's Statement.—From a neurologic standpoint the case presented several interesting and very instructive features.

First, the very early appearance of delirium without other symptoms of profound intoxication, and with no signs of organic disease. The rather quiet delirium of the confusional sort, with no definite tendency to depression or exaltation; no definite type of delusion or hallucination enabled one to exclude all of the ordinary psychoses. The varying indifference to surroundings, the occurrence of relatively lucid moments, and the well-marked impairment of recognition of time, location and personality placed the case in the class of toxic psychosis or delirium, as delirium tremens, Korsakoff's psychosis. Absence of all signs of gross organic disease allowed the provisional exclusion of meningitis, or brain abscess, consequently, a diagnosis of toxic delirium was made; source of toxemia undetermined.

Second, the appearance of ankle clonus and Babinski's sign or "extensor response" with corroborative evidence of gross brain or cord disease, was confusing. As is well known, Babinski's (or Collier's) sign indicates a lesion of the pyramidal tract. It is not to be elicited in every case of disease of this tract, but its presence in typical form is almost indubitable evidence of such disease. It is known, too, that this sign may be found in acute lesions, even a very few minutes after cerebral thrombosis or hemorrhage. Combined with delirium, another cerebral symptom, it would be taken to indicate a lesion or lesions of the cortex or subcortical tissue. Ankle clonus is also indicative of a lesion of the pyramidal tract, but is exceedingly rare in acute diseases, such as hemorrhage, thrombosis, inflammation. Occasionally it is found in rigid or hypertonic states due to compression of the motor cortex, as in meningeal hemorrhage. I do not recall having seen it well defined in acute meningitis, though I suppose it might be possible. So far as I know, neither Babinski's sign nor ankle clonus has been reported as due to intoxication without gross, or well advanced, microscopic disease. The eye grounds were negative.

Consultation with Dr. Billings.—Monday afternoon Dr. Billings was invited into consultation. The conditions were about the same, except that the pulse was steadily going up, and the temperature slightly, being 101.6, the pulse 130 and the respirations 21. There was also more or less suspicion of endocarditis and pericarditis, and it was suspected that the sepsis had invaded the cardiac structures.

Dr. Billings' Statement.—The symptoms indicated profound intoxication. There was coma, with marked congestion of the skin and of the mucous membranes, with moderate cyanosis and rapid heart action, irregular respirations, relaxed sphincter ani and retention of urine. At regular intervals a period of excitement, practically a convulsion, would occur, lasting one minute or perhaps longer. This was manifested by a deeper redness of the skin and mucous membranes, a tonic contraction of all the voluntary muscles, by gradually increasing respiration, both in number and depth of chest movements, by stertor, by a tumultuous beating of the heart, by dilatation of the pupils and, at times by escape of the fluid contents of the rectum. The tonic contractions of the muscles occurred with the extremities extended and the head drawn slightly backward, with the neck muscles rigid. In the early stages the forearms were alternately flexed and extended with the hands closed. The stage of excitement was followed by a longer period of quiet. During this time the respirations were quiet, slow, shallow and almost imperceptible. The heart beat rapidly, but not as forcibly as during the stage of excitement. The muscles were relaxed, the pupils equal and moderately wide. Physical examination of the chest showed no abnormal lung findings. The heart showed evidence of dilatation. The apex beat was displaced to the left and was diffuse. The left border dullness was one inch to the left of the nipple line, the base to the second rib, and the right border one inch to the right of the right sternal border. During the early stage no murmurs were heard. Soon a loud apical and basic systolic murmur could be heard during the period of excitement. During the last day systolic murmurs could be heard at all times and during the convulsive period, with the tumultuous beating of the heart loud churning murmurs were heard. During the last day a distinct to-and-fro friction could be plainly heard over the base of the heart. There can be no doubt that acute dilatation of the heart occurred. Postmortem contraction and rigidity of the heart muscle of course does not negative this statement.

Termination of Case.—The progress on the following day, Tuesday, was uneventful, the pulse remaining high much of the time, the temperature varying between 99.4 and 101.8, respirations between 22 and 28. Cheyne-Stokes respiration was present. The conditions continued without material change until Wednesday morning, when the temperature gradually began to rise; the pulse became very irregular and rapid, and finally death ensued at 2 o'clock, 110 hours after operation.

AUTOPSY.

The postmortem examination made by Dr. Hektoen at the expiration of seven hours revealed the following facts:

Anatomic Diagnosis.—Recent laparotomy; wound removal of vermiform appendix and of left ovary and tube; local purulofibrinous peritonitis about field of operation; retrocecal ecchymosis; thrombus of left ovarian vein; fatty changes in the liver; swollen spleen; chronic nephritis (minimum degree), with acute degeneration; multiple ecchymoses; edema and congestion of lungs; acute bronchitis; chronic fibrous peritonitis about right tube and ovary. Menstruation.

Macroscopic Examination.—The body is that of a well-developed, well-nourished girl. It is still warm and rigor-mortis is beginning. There is a recent sutured incision with normal margins to the right of the median line, beginning on a level with the navel and running down about 10 centimeters.

The general abdominal cavity is empty; in the pelvic portions there is some turbid blood; the omentum, ileum, cecum and sigmoid are matted together by a fibrinous exudate in the

pelvis and behind the incision, the upper inner part of which is gaping, the margins here appearing somewhat soft and yellowish. The vermiform appendix is absent, the stump closed and water tight, with yellowish margins. The left tube and ovary are absent, the stump being sutured, the margins soft and yellowish. The left ovarian vein is closed by a red, quite firm, adherent clot. The right tube and ovary are embedded in firm, fibrous adhesions and flattened out beyond recognition against the bladder and wall of the pelvis. There is a large area behind the cecum sparsely infiltrated with blood.

The pleural and pericardial cavities are empty and smoothly lined. The lungs are somewhat congested and edematous, especially posteriorly. There is no bronchitis. The heart contains some blood; the endocardium is smooth; the muscle is firm; the intima of the aorta, vena cava and iliacs is smooth.

The spleen is large and quite firm; the Malpighian bodies are large and distinct. The liver is universally yellow, with no lobular centers; it is quite firm and larger than normal. The stomach is normal, with some softenings of the mucosa and some ecchymoses. The kidneys are large and firm, the capsules adherent in a few small places, the cortex thicker than normal, the markings not distinct; ecchymoses are present in the pelvis. The urinary bladder is normal; there are some ecchymoses in the mucosa.

The brain and its membranes are normal.

Microscopic Examination.—Kidneys: There are some chronic fibrous changes as shown by partial or complete obliteration of an occasional glomerulus and some, though slight, increased thickness of the capsules of many glomeruli. The most striking change is the presence of large amounts of granular material (coagulated serum) in the cavities of the glomeruli visibly compressing many of the tufts. The cells lining Bowman's capsules are not much changed. The convoluted tubules are filled with a similar granular material, while the epithelial cells are well preserved. There is marked congestion of the vessels.

Liver: There is an advanced fatty change at the peripheries of the lobules. The central portions are congested, the columnar arrangement of the liver cells is thrown into disorder.

Spleen: This organ shows great congestion; the follicles are cellular.

Lungs: There is great congestion in the posterior parts of the lower lobes; here the cells contain many blood corpuscles, some being crowded. Some of the bronchioles are filled with leucocytic exudate.

Heart: The heart shows no changes.

Internal Margins of Abdominal Incision: There is marked congestion and leucocytic infiltration, but no demonstrable bacteria.

Left Ovarian Vein: A recent red thrombus is present. There are no bacterial masses.

Bacteriologic Examination.—Two flasks of broth and two of ascites broth inoculated with 1.5 c.c. of blood withdrawn from the right elbow twenty hours before death remained sterile.

Cultures from the heart's blood, the liver and the spleen made at the autopsy remained sterile. Cultures from the peritoneal exudate gave *Streptococcus* and *Staphylococcus pyogenes aureus* in agar plates, in milk tubes and on blood-agar slants. The smears from the exudate showed only a few cocci.

Remarks.—It is to be noted that the local peritonitis was limited to the area from which the appendix and gangrenous cyst had been removed and that it was less marked at the time of postmortem than at the time of operation. Sections of the appendix and cyst showed streptococci and staphylococci.

Blood: The blood conditions during the postoperative period were as follows: The first day, Saturday, leucocytes 12,800, the second day, Sunday, not noted. The third day, Monday, 15,200, the fourth day, Tuesday, 14,800. Evidently not especially significant.

Urine: The urinary conditions were significant. The urine was examined before the operation and found to be negative. Following this examination it was examined frequently, and found on January 23, which was Monday, to be a highly concentrated urine, with an acidity of 11.6, containing diacetic acid, a trace of acetone and one and one-fourth (1.25) grams per liter of albumin, and a number of hyaline, granular and waxy casts. A subsequent examination on the same day showed less albumin, no acetone and less diacetic acid. The following day, Tuesday, there was still albumin, diacetic acid and a little blood. Later in the same day it was still highly acid, with less albumin, more diacetic acid and a great deal of blood. The same day, at 3:30 p. m., diacetic acid was absent; the other conditions were unchanged. Later, Tuesday, the conditions were the same, but with no diacetic acid. The next day, Wednesday, the urinary conditions were much the same; there was less blood and albumin and no diacetic acid. At 9 a. m., on Wednesday, the day of death, there was the same condition of nephritis, with no diacetic acid, but a great deal of blood.

It is to be noted that her breath on Tuesday and Wednesday had a sweetish, acetone odor.

Opinions of Physicians in the Case.—The opinions during the progress of this case were various. First, the assumption was that it was septic. Certain of the consultants had a reservation, feeling that it was some sort of autotoxic condition. A blood examination made by Dr. Hektoen during life was entirely negative.

The commentary of Dr. Patrick on the nervous manifestations particularly bearing on the question of meningitis is herewith included.

The deduction of Dr. Hektoen from his postmortem investigations is also included.

The deceptive signs indicating cardiac involvement with absolutely negative findings at autopsy are interesting.

The true nature of this experience has only unfolded itself gradually under the enlightening influence of the negative findings and an exhaustive study of the literature.

REVIEW OF LITERATURE.

There have appeared in the literature from time to time since 1846 and 1847—the years marking the introduction of anesthetics—the reports of a number of cases resulting fatally after operations, in which anesthetics were employed. These cases presented unusual symptoms, and postmortem findings which could not be attributed to the more common causes of death after operation, such as shock, hemorrhage, sepsis, pneumonia, uremia, etc.

A certain considerable number of these obscure cases, because of the identity of symptoms and postmortem findings, evidently belong to the same group and are certainly the result of the same obscure causes.

The cases to which I refer have been reported under several headings. Guthrie[1] reports nine fatal cases under the title, "Some Fatal After Effects of Chloroform on Children." Brewer[2] reports a similar case as "Fatal Acetonemia Following an Operation for Acute Appendicitis." Kelly reports these cases under the title of "Acid Intoxication; Its Significance in Surgical Conditions."

Brackett, Stone and Low[3] report this group under the title of "Aciduria (Acetonuria), Associated With Sudden Death After Anesthesia." Other authors have reported these cases as deaths due to acute yellow atrophy of the liver. Cohn[4] reports a case under title of "A Case of Protracted Effect of Chloroform, with Fatal Termination."

Stocker[5] reports a case identical with our own as one

1. Guthrie, L. G.: "Some Fatal After Effects of Chloroform on Children," Lancet, 1894, I, pp. 193-257.
2. Brewer, G. E.: "Fatal Acetonemia Following an Operation for Acute Appendicitis," Ann. of Surg., 1902, xxxvi, p. 481.
3. Brackett, E. G., Stone, J. S., Low, H. C.: "Aciduria (Acetonuria) Associated with Sudden Death After Anesthesia," Boston Med. and Surg. Jour., 1904, cli, p. 2.
4. Cohn, Max. "Ein Fall von protrahirter Chloroform wirkung mit todtlichen Ausguage," Deut. Zeits. f. Chir., 1902, lxiv, p. 189.
5. Stocker: Centralbl. f. Gynäkologie, 1895, No. 45.

of acute yellow atrophy of the liver after the twisting of the pedicle of an ovarian cyst. Without doubt many of those deaths have not been correctly interpreted, and have been regarded as deaths due to late shock, fat embolism, sepsis, meningitis, uremia, etc.

Within the last year the evidence on this subject has accumulated rapidly, and it would seem that the time has arrived when the large number of clinical reports and the experimental laboratory findings have thrown enough light on this obscure subject to warrant an attempt to analyze the evidence at hand and to determine the essential cause of death, to describe the usual symptom-complex and to determine the postmortem findings of this heretofore little understood pathologic condition. Most of us, I believe, even those of us who have had a comparatively wide experience in surgery, have felt that after the giving of an anesthetic, if the patient recovered from its immediate effects, that there were no further dangers from the anesthetic, except such well-known dangers as pneumonia and nephritis, conditions which could be recognized readily by proper means of diagnosis. We have thought little about, and paid little attention to the possibility of late obscure poisonous effects of chloroform and ether which were difficult to recognize, and frequently fatal in termination. Yet as early as 1850, Casper[6] recognized the late poisonous effects of chloroform, and in 1862 said:

> It can no longer be doubted that there is such a thing as chronic poisoning by chloroform—that is, that the drug when it does kill does not always kill instantaneously, but that hours, days or even weeks may elapse during which the person anesthetized remains continuously under the influence of the poison to which he at length succumbs.

Experimentally, the truth of Casper's statement has been proved by a number of investigators. Nothnagel,[7] in 1866, proved that chloroform produced a fatty degeneration of the liver and heart muscle, when injected subcutaneously or into the stomach.

Ungar,[8] in 1887, showed that chloroform inhaled by animals as it is used as an anesthetic produces a fatty degeneration of various organs, especially of the liver, very similar to the fatty degeneration of the liver in phosphorus poisoning.

Strassmann,[9] in 1889, showed that animals weakened by loss of blood and then chloroformed showed a much more extensive fatty degeneration than those not so weakened.

In 1890, Thiem and Fischer[10] reported the first case in clinical work of a man who died four days after chloroform anesthesia, in whom the postmortem showed fatty degeneration of the liver.

Bastianelli,[11] in 1891, reported three deaths occurring in from three to ten days after chloroform narcosis, without any other apparent cause. These patients presented as symptoms: Vomiting, icterus, delirium and coma, and at postmortem in one case extensive fatty degeneration of the liver was found.

Fraenkel,[12] in 1892, reported cases with careful microscopic and macroscopic studies of the changes of the internal organs after protracted chloroform narcosis. In each case, he noted extensive changes in the liver cells, but did not attribute the death to these, as there were no symptoms definitely pointing to the liver, after chloroform anesthesia.

Luther[13] in 1893 noted the occurrence of icterus.

Bandler,[14] in 1896, after a review of the literature up to that time, and a careful study of a case in Wölfler's clinic, came to the conclusion that chloroform under certain conditions can produce serious effects a long time after its inhalation. The effects on the heart and kidneys are well known and fairly generally recognized. The changes produced in the liver are little known and understood. He believes, however, that the liver is affected by chloroform used as an anesthetic in varying degrees from a scarcely perceptible lesion to an almost total destruction of the organ.

Bandler cites the fact that Nachod found bile in the urine after chloroform anesthesia, without any apparent icterus. He himself had found it in ten cases in which there was scarcely any evidence of icterus in the sclera. He believes that the evidence of the destructive effect of the chloroform on the liver cells is found in the cases of chloroform icterus, which are marked, but which disappear in a few days, with the recovery of the patient. He believes that the extreme degree of chloroform poisoning is found in the fatal cases of acute yellow atrophy of the liver which follow its use, an example of which he reports.

In the light of his investigation, Bandler believes that just as the heart and kidneys are carefully examined before the giving of an anesthetic, and their condition recognized as important in the choice of the anesthetic agent, so the condition of the liver, if possible, should be determined before the anesthetic, and when any liver lesion is found, chloroform should not be employed, but ether should be the anesthetic of choice, because, as he showed by animal experiments, ether does not produce the destructive effects on the liver cells found so constantly after chloroform anesthesia.

Offergeld,[15] in 1905, in an experimental study of the poisonous effects of chloroform on the kidneys, presents some most interesting results.

> Animals chloroformed for a long time (up to two hours), after recovery from the immediate effects of the anesthetic, seemed perfectly well, played about and ate. On the second day they were less lively, and not so hungry as usual. Later, they would lie down in the corner, and could be made to move about only with difficulty, and then they would at once lie down again; usually at the end of from 48 to 60 hours they were dead. A postmortem examination showed that in these animals—rabbits, guinea-pigs—after a single narcosis parenchymatous degenerations occur in the heart, liver and kidneys, which produce death after a short time, even though the animal has apparently stood the anesthetic well.
>
> In a second series of experiments it was shown (*a*) that fatty degeneration of the kidney did not occur in the kidney which had its arterial supply cut off by ligation of the renal artery after forty minutes' anesthesia; (*b*) that fatty degeneration of the kidney occurred in a most pronounced type after ligation of the renal vein, after thirty minutes' anesthesia; (*c*) that fatty degeneration occurred more rapidly after ligation of the ureter, even after twenty-five minutes' anesthesia.
>
> In a third series of experiments, in which an artificial nephritis had been produced, extensive injury was produced, even by fifteen-minute anesthesia.

6. Casper: Quoted by Guthrie, Lancet, 1903, No. II, p. 10.
7. Nothnagel: Berl. klin Wochft., 1866, iii, 31.
8. Ungar: Vierteljahrschrf. f. gerichtl. Med., 1887.
9. Strassmann: Virchow's Arch., 1889, cxv, I.
10. Thiem and Fischer: Deuts. Medizinalzeit, 1889.
11. Bastianelli, R.: "Sulla morte tardiva per chloroformio." Bull. della societe Lancisiana deglia Ospedali di Roma, June 22, 1890, p. 325. Abstract in Rev. de Sciences Med., 1892, vol. xxxix, p. 625.
12. Frankel, E.: Virchow's Arch., 1892, Bd. 127, 129.
13. Luther: Klin. Zeit. in Streit fragen, 1893.
14. Bandler, v.: "Ueber den Einflusz der Chloroform und Aethernarkose auf die Leber." Mittiel. aus den Grenzgebelt der Med., 1896, Bd. I, p. 303.
15. Offergeld: "Experimental Beitrag z. toxischen Wirkung des Chlororforms auf die Nieren." Arch. f. klin. Chir., 1905, vol. lxxv, p. 758.

In a fourth series the kidneys were injured by mineral acid and mercury, and then short—ten, fifteen and twenty-minute —anesthesias were found to be followed by death and the usual fatty degenerations.

In a fifth series the kidneys were injured by pus germs, and it was shown that a nephritis greatly favored fatty degeneration after chloroform narcosis.

In another group diphtheria toxins were injected into the animals, with the result that it was shown that the kidney inflammation produced by these poisons furnished an excellent soil for the development of fatty degeneration after chloroform narcosis.

In a sixth series, in which pregnant animals were employed, it was found that pregnancy in itself did not favor fatty degenerations, but that pregnancy complicated with kidney lesions did.

In a seventh series animals which had recovered from a previous short anesthesia were again chloroformed, and it was found that the fatty degeneration produced by the first anesthesia favored greatly the intense injury of the kidneys from a second anesthesia.

In an eighth series an effort was made to ascertain the effect of diet, and the conclusion was reached that after chloroform narcosis the urea in the presence of a nephritis is irregular in amount.

In a ninth series, after twenty-minute anesthesias on a number of animals on the same day, one was killed each day, and it was found that regeneration is possible.

In a tenth series the conclusion was reached that after chloroform narcosis fat disappears in the tissues and accumulates in the liver, so that the percentage of fat increases in the liver, while it decreases in the other organs.

In an eleventh series the conclusion is reached that the anesthesia produced by chloroform and oxygen does produce degenerative changes in the kidney, but only to a limited degree, and in a few days complete recovery follows.

Offergeld experimented a little with ether, but found that most of his animals died, even after from thirty to sixty-minute anesthesias, of pneumonia.

Offergeld believes that there is a certain idiosyncrasy in regard to chloroform and that some individuals can take amounts without injury which would produce extensive degenerations in another. He points out the importance of the knowledge that anemic and cachectic conditions of the patient favor the poisonous action of chloroform, and also the dangers of repeated anesthesias following closely one after the other.

Offergeld found constantly in his experiments that the most marked change at death was found in the liver. He came to the conclusion, however, that death is due to the production of a nephrolysin resulting from the effect of the chloroform on the kidney cells.

Offergeld believes that the prevention of this ill effect of chloroform may be accomplished by the use of a mixture of chloroform and oxygen.

Under the title of fat metamorphosis in the internal vital organs after simple and mixed narcosis, Benno Müller[16] this year reviews much the same ground. Müller made fifty animal experiments, with the usual anesthetics. His conclusions are as follows:

1. Anesthesia with chloroform, chloral hydrate, bromethyl and chlorethyl, ether and mixtures of these always produce changes in the internal organs, which appear as beginning fatty changes.

2. Fatty changes occur also in the epithelium of the respiratory tract.

3. The fatty changes in degree and extent depend on the time and number of the anesthesias.

4. The power of the various anesthetics to produce fatty changes is in direct proportion to their anesthetic power.

5. These fatty changes usually disappear shortly after the anesthesia. If a second anesthetic, however, is given before the fatty changes of the first have been recovered from, the effects of the second are enhanced and the cells become necrotic.

It makes little difference when the second anesthetic is given, the fatty changes after the second are twice as severe as from the first.

6. The anesthetic continues to produce fatty changes as long as it is present in the blood. The fatty changes can not go on to restoration to normal until the blood has freed itself from the last vestige of the drug.

7. It is hazardous to give a second anesthetic within three days after the first, and the anesthesia should be as short as possible.

8. Pneumonia occurs frequently after ether and ether mixtures; because of a possible pneumonia after a first ether anesthesia, one should choose chloroform for a second.

9. Each anesthetic produces after long use an increase in the mucous secretion. One finds in the lung after each anesthesia small areas filled with mucus (not infected pneumonic areas), which very soon disappear, but which are greatly increased by a second anesthesia inside of from twenty-four to forty-eight hours.

10. Chloral hydrate forms chloroform in the system.

11. The mixed anesthesias have no property of prevention of fatty changes in the internal organs.

12. Every anesthetic produces fatty changes in the vessel walls of the brain, and in the ganglion cells up to a certain stage and in the other internal organs.

16. Müller, B.: "Ueber Fettmetamorphose in den inneren faren chym lebens wichtige Organen nach Einfachen u. Much narkosen." Archiv. f. klin. Chir., 1905, No. lxxv, p. 876.

THE CLINICAL SIDE.

With the assistance of Dr. Dean D. Lewis, we have collected from the literature 27 fatal cases after anesthesia, making with our own 28, which from symptoms and postmortem findings belong, we believe, to the same group. In two cases reported in the literature the patient recovered:

Bastianelli reported 3 cases; Bandler, 1 case; Ballin, 1 case; Brackett, Stone and Low, 3 cases; Brewer, 1 case; Cohn, 1 case; Erlach, 1 case; Guthrie, 14 cases; Kelly, 1 case; Marthen, 1 case; Stocker, 1 case; Mintz, 1 case; Bevan and Favill, 1 case. Total, 30. Chloroform was employed in 23 cases; ether in 4 cases; Billroth mixture in 1 case; not stated, 2 cases. Total 30.

We summarize below the essential facts in each case:

Bastianelli,[11] in 1890, reports 3 cases in which death occurred on from the third to the tenth day following the use of chloroform. In two of the patients vomiting was frequent and profuse. The patients were icteric and restless. Just before death they became comatose. Autopsy revealed a fatty degeneration of the heart, kidneys and liver. The fatty changes in the latter organ were most marked in the center of the lobule and resembled closely those found in other poisoning, especially phosphorus.

The original article was not accessible, and no statement can be made concerning the age, sex and predisposing causes.

These are probably the first cases reported and published of true late chloroform poisoning. Thiem and Fischer published somewhat earlier the autopsy findings in a patient dying four days after chloroform, but this case must be accepted with some reserve, as it is regarded by Fraenkel as delirium tremens.

Guthrie, in 1894, reports the clinical histories of ten patients; nine died and one recovered. The autopsy findings in eight fatal cases are given:

CASE 1.—Male child, aged 3, under the care of Mr. Watson Cheyne, was operated on in 1887 for vesical calculus. There were no predisposing causes. Chloroform was used as an anesthetic. Two and one-half hours after the operation the child was restless. Vomiting was noted at this time. Eight hours after operation the child repeatedly uttered piercing shrieks, tossed about in bed, and was sweating profusely and was cold.

Death occurred suddenly ten hours after operation. Screaming continued until a few hours before death.

Autopsy.—Lungs and liver normal; spleen slightly enlarged; kidneys, both in early stages of granulation, congested; capsule somewhat adherent. Brain congested, but no evidence of inflammatory changes in meninges.

CASE 2.—Female child, aged 7, under the care of Mr. Stanley Boyd. Anemia possible predisposing cause. An excision of the knee joint was done under chloroform anesthesia. The carbolic acid spray was used. Patient was collapsed after the operation. Four and one-half hours after the operation the child began to vomit incessantly. Shrill screams were uttered. the restlessness finally passed into coma, and death resulted twelve hours after the operation.

Autopsy.—The pelves of both kidneys contained pus. All other organs appeared normal.

CASE 3.—Female child, aged 4, under the care of Mr. Watson Cheyne, was operated on for double genu valgum. Chloroform was used as an anesthetic. The operation lasted about one hour. No predisposing causes. Vomiting commenced about five hours after operation. The child became delirious; the delirium alternating with apathy. Child screamed constantly. Temperature rose to 102, just before death, which occurred twenty-seven hours after operation.

Autopsy.—The liver was found somewhat pale and greasy. Kidneys and spleen were normal. The heart muscle was pale, but not fatty. There was considerable venous congestion in the brain; otherwise normal.

CASE 4.—Male child, aged 1 year 4 months. Service of Mr. Watson Cheyne. Carbolic-acid intoxication may have been predisposing cause. Operation was done for congenital hydrocele under chloroform anesthesia. Lengthy operation. Excessive vomiting was noted soon after operation. Death occurred twenty-four hours after completion of operation.

Autopsy.—Liver large, firm and pale. Microscopically, fatty infiltration.

CASE 5.—Male child, aged 4. Service of Mr. Stanley Boyd. Operation for correction of double talipes equino varus, resulting from infantile paralysis. Chloroform anesthesia. Symptoms began thirteen hours after operation. Vomiting was frequent and profuse. Child soon became unconscious. Just before death temperature rose to 101. Death occurred thirty hours after operation.

Autopsy.—Liver small, weighing 14½ ounces; microscopically, two-thirds of the external portion of the lobule was fatty. There was intense fatty infiltration, perhaps unaccompanied by fatty degeneration.

CASE 6.—Female child, aged 8. Service of Mr. Stanley Boyd. Carbolic-acid intoxication was possible predisposing factor. Operation for double genu-valgum; lasted one hour and ten minutes. Chloroform anesthesia. The symptoms were vomiting, restlessness and coma. Death occurred fifty-three hours after anesthetic.

Autopsy.—Liver small, weighing 1 pound 3 ounces.

CASE 7.—Female child, aged 4, well nourished and apparently healthy. Service of Mr. Stanley Boyd. Chloroform anesthesia; chloroform taken badly. Iliac abscess was opened and 2 ounces of 10 per cent. iodoform glycerin emulsion were injected. Collapse after operation. The symptoms were intessant vomiting; child either apathetic or extremely restless and delirious. Carboluria noted. Death occurred six days after operation. Temperature shortly before death reached 104.6.

No autopsy permitted.

CASE 8.—Female child, aged 2. Service of Mr. Watson Cheyne. Child was apparently in good health; iliac abscess was opened under chloroform. Anesthesia lasted about fifteen minutes, and one-half ounce of chloroform was taken well. Twelve hours after operation the child was dull and apparently in shock. Death occurred fourteen hours after operation.

Autopsy.—Peritoneum congested. Some fluid found about abscess. "No apparent cause of death."

CASE 9.—Female child, aged 8½. Service of Mr. Watson Cheyne. No predisposing cause. Psoas abscess was opened under chloroform and irrigated with 1-4,000 bichlorid solution. The child was pale and restless after operation. The symptoms were severe abdominal pain, nausea and vomiting; diarrhea with some blood in stools. Temperature 95.8. The symptoms persisted for three days, then abated, and recovery followed. Judging from the character of the symptoms and the use of bichlorid in the operation, it seems that mercurial poisoning should be considered in this case.

CASE 10.—Female child, aged 4. Service of Mr. Pollard. Operation under chloroform for double psoas abscess and spinal caries. Operation lasted about one hour. Symptoms were noted four hours after operation. Child was very restless, calling for water; flushed; pulse full. Sixteen hours after operation child was restless, with wild look; temperature 103. Death occurred sixteen hours after operation.

Autopsy.—Liver large and pale; fatty on section. Kidneys soft and pale (postmortem). Tuberculous glands about root of lung; one had ulcerated into root of lung. Calcareous tubercles in lung. Caries of body of third lumbar vertebra.

(*To be continued.*)

OSSIFICATION OF THE LOWER JAW IN MAN.*

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From the fact that there are so many different accounts given of the ossification of the lower jaw, it is evident that the question is in need of reinvestigation. Nothing more recent than Bland-Sutton's account seems to have been published on the subject, and that is based on work apparently done in 1883[1] and, as will be seen, it can be by no means considered conclusive.

It is necessary to state the various accounts as the recognized text-books give them in order to appreciate the great diversity of opinion which exists.

If we begin with Quain, we find the following statement:

The largest part of each half is formed from a deposit (dentary) in the membrane on the outer side of Meckel's cartilage, and to this there is added a second smaller plate (splenial) which forms the inner walls of the tooth sockets, terminating behind in the lingula. A small part of the body by the side of the symphysis results from the direct ossification of the anterior end of Meckel's cartilage; and, posteriorly, the condyle and a portion of the ramus, including the angle, are developed from another ossification in cartilage.

Macalister[2] says:

One center of ossification begins in the embryonic tissue around Meckel's cartilage on the thirty-eighth day. A supplemental patch of cartilage appears in this tissue at the angle and a second at the condyle. Centers of ossification, condylar and angular arise in each of these patches, and a third in the median end of Meckel's cartilage; a fifth or splenial center arises in the lingula. These all very rapidly unite, so that by the fourteenth week but one bony mass is present on each side.

Kollman,[3] who quotes Toldt,[4] Stieda[5] and Schafer,[6] says that the anlage of the lower jaw can be seen in an embryo of 30 mm. from neck to tail. The ventral site of union of both Meckel's cartilages is surrounded by bony lamellæ which arise, not out of cartilage, but out of mesoderm and develop upward, following Meckel's car-

* Read in the Section on Stomatology of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

1. Trans. Odont. Soc.
2. Text-book of Anatomy, p. 242.
3. Entwickelungsgeschichte des Menschen, p. 261.
4. Toldt: Zeitft. d. Heilk. Vol. v, 1884.
5. Stieda: Arch. f. mikroskop. Anat., vol. 11, 1875.
6. Schaffer: Arch. f. mikroskop. Anat., vol. xxii, 1888.

tilage. They form at the side two bony lamellæ, which come together dorsally, and between the lamellæ runs the inferior dental nerve. Further upward, the bone becomes thinner, to again thicken in the neighborhood of the auditory capsule. There are few places where one can so clearly observe the independence of covering bone from that arising from cartilage. Further, the origin of the jaw becomes complicated through the appearance of hyaline cartilage, which arises secondarily, quite independently of Meckel's cartilage. This occurs in the region of the median incisor tooth from the upper external alveolar border as far as the region of the canine tooth and on the coronoid and condyloid processes.

In the fetus of from 15 to 18 cm., only traces (of cartilage) are present, and these accessory nuclei have only a provisional significance. They atrophy, owing to the formation of new bony tissue, just as does Meckel's cartilage. Fresh researches are required to determine whether these ossifications have any phylogenetic meaning.

In "Gray's Anatomy," in the article edited by Howden, the following statements are made:

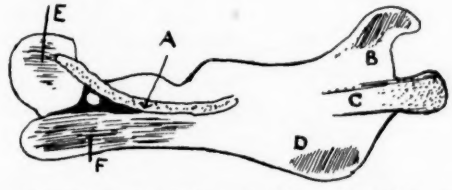

Fig. 1.—Scheme after Sutton. E. Mento-Meckelian center. F. Dentary. A. Splenial. B. Coronoid. C. Condyle. D. Angular.

Fig. 2.—Scheme of Meckel's cartilage: M, malleus end; A, anterior end.

The lower jaw is developed principally from membrane, but partly from cartilage. The process of ossification commences early, earlier than any other bone, except the clavicle. The greater part of the bone is formed from a center of ossification (dentary) which appears between the fifth and sixth weeks in the membrane on the outer surface of Meckel's cartilage. A second center (splenial) appears in the membrane on the inner surface of the cartilage, and from this center the inner wall of the sockets of the teeth is formed; this terminates above in the lingula. The anterior extremity of Meckel's cartilage becomes ossified, forming the body of the bone on each side of the symphysis. Two supplemental patches of cartilage appear at the condyle and at the angle, in each of which a center of ossification for these parts appears; the coronoid process is also ossified from a separate center. At birth the bone consists of two halves united by a fibrous symphysis in which ossification takes place during the first year.

In Cunningham's "Text-book of Anatomy," p. 141, we find it stated that:

The development of the lower jaw is intimately associated with Meckel's cartilage, the cartilaginous bar of the first visceral or mandibular arch. Meckel's cartilages, of which there are two, are connected proximately with the periotic capsule and cranial base. Their distal ends are united in the region of the symphysis. It is from the connective tissue overlying the outer surface of the cartilaginous arch that the bulk of the lower jaw is developed. The cartilage itself is not converted into bone, but undergoes resorption, except at its anterior extremity, which is stated to undergo ossification to form the part of the jaw lying between the mental foramen and the symphysis. In a third or fourth month fetus, the cartilage can be traced from the under surface of the forepart of the tympanic ring downward and forward to reach the jaw, to which it is attached at the opening of the inferior dental canal; from this it may be traced forward as a narrow strip applied to the inner surface of the mandible which it sensibly grooves. The proximal end of this furrow remains as the mylo-hyoid groove. The part of the cartilage between the tympanic ring and the jaw becomes converted into fibrous tissue and persists in the adult as the so-called internal lateral ligament of the temporo-maxillary articulation, its proximal end through the Glaserian fissure being continuous, with the slender process of the malleus. The part which is applied to the lower jaw disappears. In the tissue overlying the cartilage ossification begins by several centers as early as the sixth or seventh week of fetal life, in this respect resembling the clavicle, by which it is alone preceded. The dentary or basal center forms the outer wall and lower border. With this is united the splenial portion, which appears somewhat later, forming the inner table from near the symphysis backward, toward the opening of the inferior dental canal, where it terminates in the lingula. By the

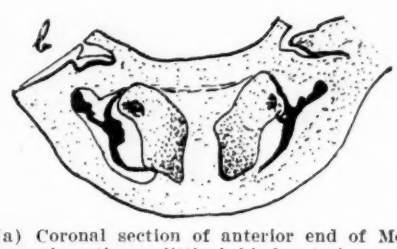

Fig. 3.—(a) Coronal section of anterior end of Meckel's cartilage. (b) Coronal section a little behind anterior end of Meckel's cartilage.

union of these two parts a groove is formed, which ultimately becomes covered in, and in which the inferior dental nerves and vessels are lodged. As has already been stated, the part of the body between the symphysis and the mental foramen is regarded as directly developed from the forepart of the Meckelian cartilage. As will have been gathered from the above description, the upper part of the ramus and its processes have no connection with Meckel's cartilage; the condyle and the coronoid process are each developed from a separate center, preceded by a cartilaginous matrix. These several centers are all united about the fourth month.

Sappey[7] describes very carefully Meckel's cartilage and, in addition, gives an account of the ossification of the lower jaw. He says:

The lower jaw appears at the commencement of the second month of intrauterine life in the form of a small ogival arch, composed of two symmetrical and continuous halves. This arch of parabolic figure constitutes the cartilage of Meckel. . . . Situated on the internal face of the bone below the mylo-hyoid ridge, Meckel's cartilage presents the appearance of a long ribbon extended between the symphysis and the front of the tympanum. By their internal extremities the two cartilages are continuous; they form thus an arcade of which the median part sends a prolongation between the two halves of the maxilla. Their external extremity projects be-

7. Fourth edition, 1888, p. 241.

yond the corresponding bony part and applies itself to the anterior part of the tympanic ring and penetrates into the cavity of the tympanum. . . . Ultimately Meckel's cartilage disappears, first in its intermediate part, then at its anterior extremity; only the posterior part remaining as the malleus and incus. In front of the cartilage of Meckel appear two centers of ossification in a cartilage not well known, one right, the other left, toward the thirty-fifth day. They extend rapidly along the whole length of each half of the bone.

Testut,[8] who quotes from Kolliker, Brock, Masquelin[9] and Julin,[10] says that the lower jaw is primitively double, that each half is developed quite independently of the other, and that the bone which covers it does so just as the bones of the membranous cranium cover the primitive chondrocranium. He states, too, that the osseous condyle is preceded by a cartilaginous condyle. Thus, each half is a mixed bone, developing partly from embryonic connective tissue and partly from pre-existing cartilage. Agreement on this point is not complete and the method of development of the mandible, especially that of the condyle, requires new researches.

Testut states that, according to Rambaud and Renault, each half of the jaw has six ossific centers visible from the fiftieth day of intrauterine life.

1. The inferior point (visible at the thirtieth or

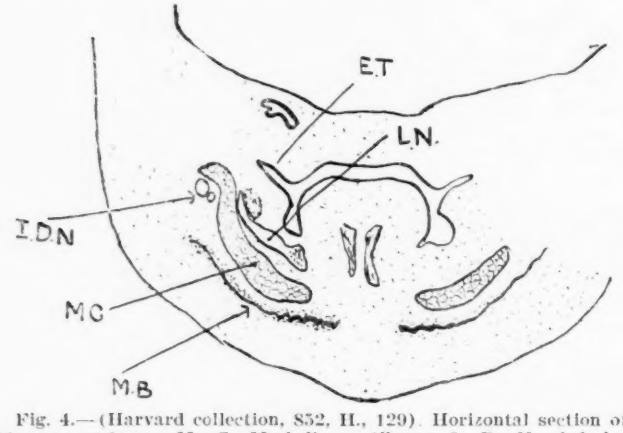

Fig. 4.—(Harvard collection, 852, H., 129). Horizontal section of 21 mm. embryo. M. C. Meckel's cartilage; I. D. N., inferior dental nerve; L. N., lingual nerve; E. T., Eustachian tube; M. B., membrane bone.

thirty-fifth day), a small train of osseous granules, situated toward the inferior border of the bone.

2. The invisive point, situated on each side of the symphysis in the region which the incisors will occupy later.

3. The supplementary point of the mental foramen, which helps by its inferior surface to form the mental foramen.

4. The condyloid point, which will form the condyle and subjacent portion of the ramus.

5. The coronoid point, out of which will develop the coronoid process and the portion of the ramus which forms its base.

6. The point forming the spine of Spix, situated on the posterior surface of the bone from the superior orifice of the future dental canal as far as the incisive piece.

According to Cruveilhier.[11]

The inferior maxilla is developed by two points of ossification, one for each lateral half. Antemieth admits, in addition, three complementary points, one for the condyle, one for the coronoid process and one for the angle, but I have never observed them. The case is different, however, with a point of ossification described and figured by Spix, which forms the inner side of the alveolar border or rather of the dental canal. In a fetus of about fifty or sixty days, I have seen a kind of bony spiculum which passed along the internal surface of the body and ramus of the bone. On one-half of the maxillary bone this spiculum was entirely free, but that of the other side adnered by the internal third of its length. The spine which surmounts the dental canal is nothing more than the extremity of this bony spiculum. It follows, therefore, that the inferior maxilla is developed from four points of ossification. The inferior maxilla takes precedence of all the bones of the head in its development and, indeed, of all the bones of the skeleton, except the clavicle. The inferior edge of the body of the bone appears as early as the thirtieth or thirty-fifth day. This extends backward to form the ramus and forward to form the portion which supports the incisor teeth. It is probable that the osseous point of the dental canal, mentioned above, appears at the same time. At a later period the groove becomes very considerable and is divided into alveoli by septa which at first are incomplete, but afterward become perfect; the alveoli and their septa occupy at this time the entire depth of the bone.

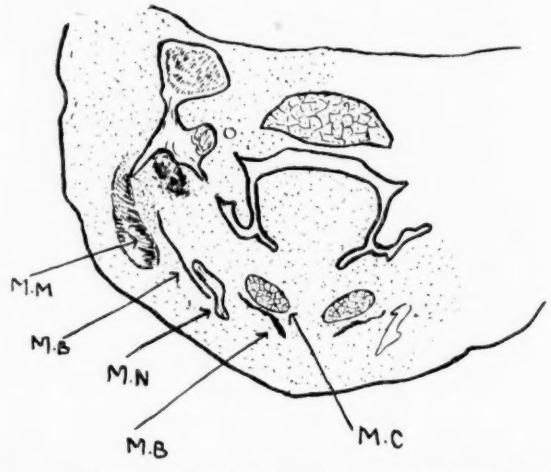

Fig. 5.—(Harvard collection, 852, G., 112.) Horizontal section of 21 mm. embryo. M. C., Meckel's cartilage; M. N., mental nerve; M. B., membrane bone; M. M.

The point of ossification described by Spix is united to the rest of the bone from the fifteenth to the sixteenth day. (Spix affirms that it remains separate until the fourth month.) The two halves of the maxilla are joined together during the first year after birth, the traces of this union exist for some time, but are afterward effaced in the lower animals; the suture remains throughout life.

According to Humphry,[12] "ossification commences in the membrane from which the inferior maxilla is formed at a very early period, from the thirtieth to the thirty-fifth day, according to Beclard. Soon after two months, it is considerably advanced. The bone is then in two halves, united in the median line by membrane. In each of these halves, the condyle, coronoid portion and angle are quite evident, the mental part is of considerable size, and there is a lamina appended to the inner side of the ramus, which, shooting upward, forms the inner wall of the dental groove and dental canal. The appearance of the several parts at this early stage certainly gives countenance to the supposition that each of them had a separate ossifying nucleus, corresponding, or nearly corresponding, with the five pieces into which the jaw of the crocodile is permanently divided; that is to say, one for the under and outer part of the ramus, another for the inner alveolar border, a third for the coronoid process, a fourth for the condyle, and a fifth for the angle. If it be so, they become united very quickly after their formation. The probability, however, is that in this bone, as in the upper jaw, there is usually only one nucleus on either side and that the various processes are merely outgrowths; the instances in

8. Third edition, p. 197.
9. Bull. Acad. Soc. de Belgique, 1878.
10. Arch de Biol. de Van Beneden, 1880.
11. Vol. 1, 1841. Transl. by Dr. D. H. Madden, edited by A. Tweedie.
12. A Treatise on the Human Skeleton, 1858, p. 290.

which the latter are developed from the separate nuclei being exceptional.

Kerkringius[13] describes the coronoid process as consisting, up to the third month, of an ossicle, separated by a suture from the rest of the maxilla. Beclard mentions, in addition to the nucleus for the ramus, which appears from the thirtieth to the thirty-fifth day, a nucleus for the coronoid process, which appears about the forty-fifth day. Autenrieth and Spix[14] describe also a nucleus for the condyle and one for the angle, to the probability of which Beclard gives assent. According to Spix, the inner wall of the jaw is derived from a separate nucleus. Blandin[15] found the body, the coronoid process and the hinder part of the bone separate from one another in a fetus of three months. As growth proceeds, the inner lamina of the ramus rises nearly to the same level with the outer and forms the inner alveolar border; the dental groove is deepened:

Near the coronoid process the inner lamina joins the outer, arching over and enclosing the dental foramen and the hinder part of the dental canal. The latter is at this time a mere channel in which the nerves and vessels lie, at the bottom of the dental groove, in the greater part of its extent.

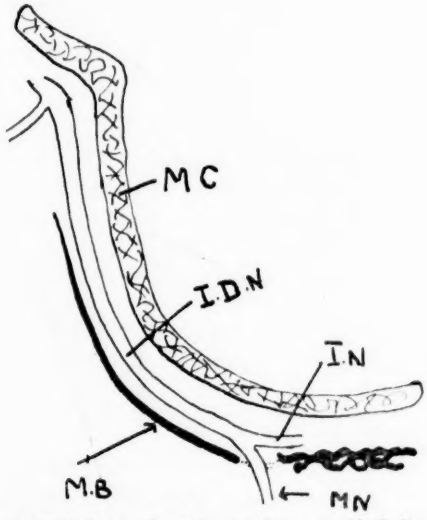

Fig. 6.—Schematic horizontal section of Meckel's cartilage; the inferior dental nerve. I. D. N., and the membrane bone, M. B. M. C., Meckel's cartilage; M. N., mental nerve.

Cleland[16] says:

The lower jaw is, next to the clavicle, the earliest bone to show osseous deposit. It is developed round Meckel's cartilage, mainly outside of it, but additional centers have been noted at the lingula, at the angle, at the coronoid process and at the condyle. The condyle is laid down in cartilage before its ossification begins, but the supposition that Meckel's cartilage is in any part converted into osseous tissue of the jaw is erroneous.

Holden[17] says:

Each lateral half of the lower jaw is represented in the early fetus by what is called the "first visceral arch or cartilage of Meckel." In the process of development, the proximal part of this cartilage is converted into the "malleus" bone of the middle ear. The distal part, mostly by the growth of bone round the cartilage, but slightly by a direct ossification of the cartilage itself, is converted into one-half of the lower jaw. The part between these two end portions becomes the "internal ligament" of the temporomaxillary articulation. The bony lower jaw begins to be formed, with perhaps the exception of the clavicle, earlier than any other bone in the body. For each of the lateral halves of the bone, we find that several osseous nuclei appear about the sixth week of fetal life in the membrane which invests Meckel's cartilage. The smaller plate forms the inferior dental canal and the inner wall of the sockets for the teeth. The symphysis end of each half of the body is formed by a direct ossification of the corresponding part of Meckel's cartilage. The condyle and part of the vertical ramus are formed by ossification of cartilage *not* connected with Meckel's, and the junction of the two lateral halves of the body at the symphysis does not take place till the first year after birth.

13. Osteogenia fœtuum, cap. ix.
14. Hildebrandt's Anatomie, ii, 113.
15. Anatomie, vol. i, p. 127.
16. Cleland and Mackay: Human Anatomy, 1896, p. 250.
17. Osteology, seventh edition, p. 121.

In 1883, Bland-Sutton[18] published a paper giving a very excellent and concise résumé of the work which had already been done on the subject and also giving the results of his own observations. He says:

The examination of numerous specimens of human maxillæ from the sixth week onward has convinced me that the lower jaw arises from six distinct centers of ossification, five of them answering exactly to those described by Spix, the sixth representing the mento-Meckelian center of Callender.

So far as I have been able to observe, the nucleus marked F. in Figure 1 is the first to appear; from this center the larger part of the body of the bone is formed. At first it resembles a shallow trough lodging the cartilage.

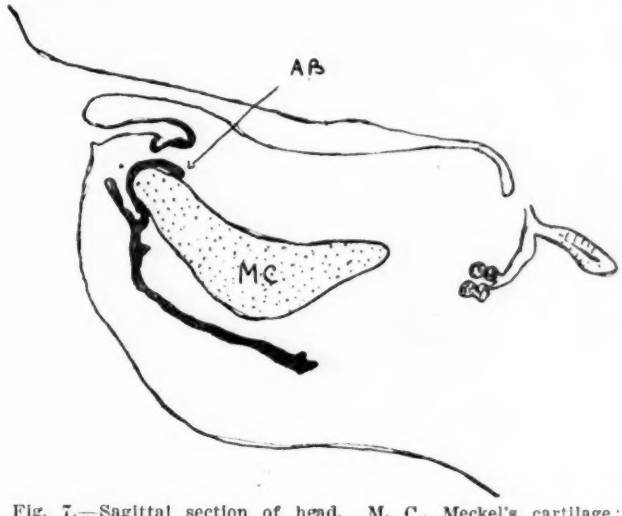

Fig. 7.—Sagittal section of head. M. C., Meckel's cartilage; A. B., alveolar border.

The nuclei for condyle, coronoid and angle follow so rapidly that it is difficult to determine their order. About the same time, osseous granules may be seen in the perichondrium surrounding the distal end of Meckel's cartilage, gradually invading its substance.

As soon as the various centers make their appearance, a thin network of osseous tissue quickly connects them. When this occurs a thin shelf of bone will be found immediately above Meckel's cartilage and the inferior dental nerve. This latter osseous streak lies on the inner side of the developing bone, quite distinct from the other centers, and represents the splenial. Now is the very best time to observe the various nuclei, particularly if the bone is rendered transparent by means of alcohol and oil of cloves. Its appearance is very striking. The bone presents the familiar shape of the fetal jaw, but its texture reminds one of a spider's web, the various centers showing like flies entangled in the mesh. (Fig. 1.)

The order of events may be arranged in stages for the sake of clearness thus:

1. Meckel's cartilage appears.
2. Dentary is seen below.
3. Centers for condyle, coronoid, angle and mento-Meckelian.
4. Network of osseous tissue connects them together.

18. Development of the Inferior Maxilla; Trans. Odontological Society.

5. Splenial appears as ledge of bone supporting teeth.
6. Disappearance of Meckel's cartilage from jaw, and fusion of splenial.

The splenial element is interesting on account of its relation to the developing teeth. On its first appearance it stands out at right angles to the dentary, serving to separate the teeth germs from Meckel's cartilage. If, at the fourth month of intrauterine life, the tissues on the inner side of the jaws be carefully dissected away, the splenial will be observed forming a distinct ledge of bone, supporting on its superior surface the dental follicles like flasks on a shelf; immediately beneath it runs Meckel's cartilage and the nerve. As the cartilage atrophies, the splenial extends downward to fuse with the dentary immediately below the nerve; in this way the mylohyoid branch gets shut off from the main portion of the inferior dental nerve. After the fourth month it extends vertically to form the inner wall of the maxilla, all trace of its originally separate condition being thus completely lost, the bone then assuming the condition which it presents at birth and with which we are all so familiar.

Let me now offer evidence of the compound nature of this bone of a different character. In the year 1814, the celebrated French anatomist, Serres, in a paper read before the Académie des Sciences, Paris, propounded certain laws bearing on ossification. Among them was one termed the "Loi de Conjugaison," by which he showed the various foramina in bones to result from the opposition of two or more distinct bones or distinct centers of ossification. To this law there were many exceptions; among the more unstable

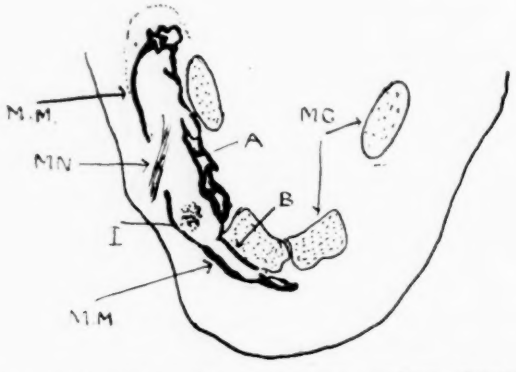

Fig. 8.—Horizontal section of 42 mm. embryo showing the growth of the inner alveolar border. M. M., primitive membrane bone; M. N., mental nerve; I., canine tooth; A., inner alveolar border; B., inner segment of that border; M. C., Meckel's cartilage.

were certain foramina in the temporal bone and the inferior dental foramina.

When I first took up the subject of nerve foramina, Serres' researches were quite unknown to me, and I took as my guide this rule: "Whenever a nerve passes through a bone it marks the confluence of two or more ossific centers." Among the earliest bones to yield under this method of analysis were the temporal and the inferior maxilla; later I became acquainted with Serres' paper, the greater part of which is published as a footnote in the French traduction of Meckel's "Anatomie Comparée, vol. iv. Much to my satisfaction, I found that my method had yielded far more satisfactory results and had banished two of the apparently most obvious exceptions to the law, and it is most interesting to trace out the intricate pathways by which many nerves quit the cranial cavity in order to avoid piercing an ossific center.

Applied to the lower jaw, the rule stands thus: The nerves concerned are the inferior dental, mental and mylohyoid. The inferior dental enters by the foramen of the same name, formed by the coalescence of the coronoid, condyloid, dentary, angular and splenial elements; the nerve then travels in a tunnel formed on the outer side of the dentary and on the inner side of the splenial. The mental branch passes out through a fenestrum formed by dentary and mento-Meckelian ossification.

The mylohyoid runs in the groove which once lodged Meckel's cartilage, the sulcus, also corresponding to the junction of splenial with dentary. As the inferior dental passes along the canal, it sends up twigs to the teeth, and these twigs occupy foramina or spaces between the splenial and dentary. The relation of nerves thus lends additional help in unraveling the mystery.

Mr. Sutton, from this point, proceeds to the comparative side of the question, quoting the condition in the dogfish, the sturgeon, the *ganoid amia*, the cod, am-

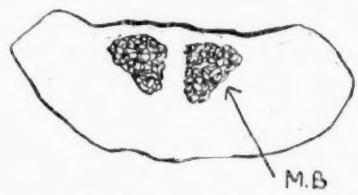

Fig. 9.—(Harvard collection, 819, Q., 233.) Coronal section of 19 mm. embryo; M. B., membrane bone.

phibia and reptiles. He finally gives a table of homologies thus:

HOMO.	FISH.
Mento-Meckelian.	Mento-Meckelian.
Angle.	Angular.
Condyle.	Articular.
Coronoid.	Surangular.
Splenial.	Splenial.
Dentary.	Dentary.

I have quoted Mr. Sutton's paper as fully as possible, because it is practically the most recent work on the subject and for reasons which I may explain later.

My own observations on the subject commenced several years ago. In cutting a section of the neck of a three months' fetus for examination of the developing larynx from above downward, the appearance of the developing jaw was such that it was evident that the last word had not been said on its ossification. Having made observations of one or two facts, namely, that Meckel's cartilage did ossify and that the so-called dentary center extended right up to the middle line (symphysis), I had to rest content, having no material available by which I might test the accuracy of statements made with regard to other centers of ossification in the lower jaw. Latterly, however, I have come into possession of fresh material, for some of which I have to thank Dr. Keith of the London Hospital, for much other material, several old pupils, and for many valuable sections, made especially for this research, Prof. C. S. Minot of Harvard University, who has taken the

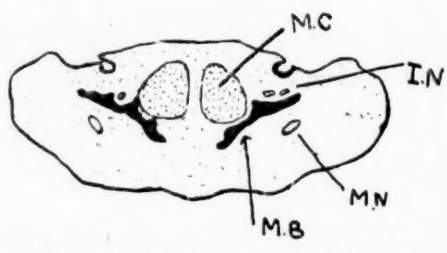

Fig. 10.—(Harvard collection, 819, P., 323.) Coronal section of 19 mm. embryo; M. C., Meckel's cartilage; M. B., membrane bone; M. N., mental nerve; I. N. incisive branch of mental nerve.

greatest possible interest and trouble over the matter. Many of the figures illustrating this paper are from sections supplied by him, and I very gladly take this opportunity of acknowledging his great kindness and at the same time the usefulness of the Harvard embryologic collection, which apparently is at the disposal of any responsible worker.

PERSONAL OBSERVATIONS.

In spite of the fact that I have come into possession of much new material, I am bound to say that I am not in a position to state exactly at what time ossification really begins, but I have cut embryos of from 12 to 15 mm. in length which may be reckoned as five and one-half weeks, and have seen no bone; ossification, however, is well advanced in embryos of from 19 to 21 mm. in length, so one may say that it occurs perhaps in

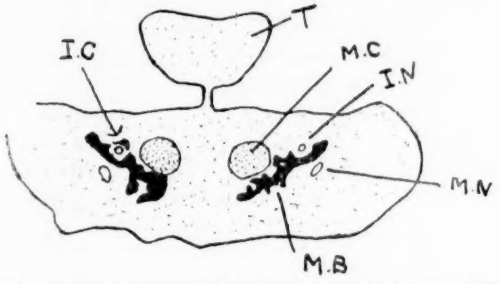

Fig. 11.—Coronal section of 19 mm. embryo; in front of mental foramen; incisor canal is just forming; M. B., membrane bone; M. N., mental nerve; I. N., incisive nerve; T. tongue; M. C. Meckel's cartilage.

the 17 mm. embryos. That, however, is not very important. It is rather to state the nature of the ossification and the number of centers of ossification which arise that this research has been undertaken.

We have seen the variety in the various accounts given in the text-books, and it remains for me to show if these accounts are accurate. In order to test these statements, sections have been made in various planes of embryos ranging from 19 mm. in length to over 100 mm., all sections being serial.

As is well known, Meckel's cartilage forms a very prominent object during the early stage in the development and ossification of the jaw, and until bone actually appears is for all practical purposes the lower jaw itself. Soon, as we have already seen, it becomes covered by ossification in membrane on its outer side, and from that time forward its importance diminishes and it ultimately disappears, except proximally and distally; proximally forming at least the malleus, and distally becoming an integral part of the bony jaw, for the time being at all events.

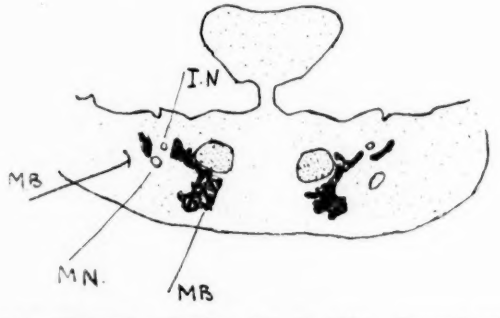

Fig. 12.—(Harvard collection, 819, P., 313.) Coronal section of 19 mm. embryo through mental foramen; M. N., mental nerve; I. N., incisive nerve.

As accounts given of Meckel's cartilage in man convey but little accurate information, and seeing that is such an important element in the formation of the jaw, it may not be out of place to make some remarks concerning it. It is somewhat late in appearance, for, although one can make out its anlage in precartilaginous conditions in the 12 to 13 mm. embryo, it does not become cartilaginous until after the femur does. This is not what one would expect, seeing that it is such an archaic structure.

When formed, the two cartilages (when seen in horizontal sections) form a horseshoe, incomplete in front, at first being separated by an appreciable interval; soon, however, they meet in the middle line, and later usually overlap one another there. Each cartilage is thickened in the vertical sense on each side of the future symphysis (see scheme of cartilage, Figs. 2 and 3). If we trace the cartilages backward from this anterior thickening, we find that they form a large bend, with the convexity outward, and still further backward form another bend, with the concavity outward, before ending in the malleus. The latter bend is found in front of the Eustachian tube. In its concavity lies the inferior dental nerve, and against its convexity the lingual nerve (Fig. 4).

FATE OF MECKEL'S CARTILAGE.

The posterior or proximal end becomes converted into the cartilaginous malleus, the anterior or distal end from about the level of the mental nerve becomes incorporated in the jaw and undergoes ossification. The remainder disappears completely. It is generally stated that a part, that stretching between the lingula of the lower jaw and the malleus, becomes the internal lateral ligament of the jaw, but that, I think, is more

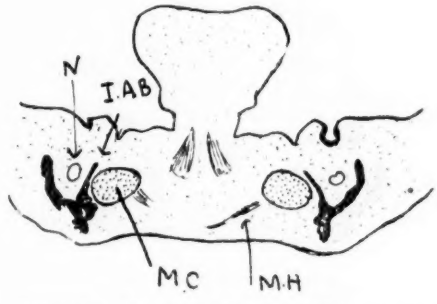

Fig. 13.—(Harvard collection, 819, O., 305.) Coronal section of 19 mm. embryo behind mental foramen to show inner alveolar border, I. A. B.; I. D. N., inferior dental nerve; M. C., Meckel's cartilage; M. H., mylo-hyoid muscle; N., inferior dental nerve.

than doubtful, as one can see the ligament quite well developed at the same time that the cartilage is also well developed, the latter lying in a groove on the inner side of the former. In the transverse horizontal section of the head of a 42 mm. fetus, the two structures appear to be quite independent of one another. So much for Meckel's cartilage for the present; it may be referred to later.

We may now examine the appearance presented by the membrane bone, and that may be best done by examination of horizontal sections primarily, then of corneal ones corrected from time to time by sections cut sagittally.

HORIZONTAL SECTIONS.

These sections were cut by Prof. Minot from an embryo measuring in length 21.8 mm. and were stained with alum cochineal and alum hematoxylin—the latter only being effective. They yielded most interesting results.

In one section (Fig. 4) one can see Meckel's cartilage M. C. sweeping backward and outward; in its anterior concavity is the lingual nerve L. N., and in the concavity of the outwardly directed posterior end of the cartilage is the inferior dental nerve, I. D. N. Behind the lingual nerve is the Eustachian tube. All these, but especially

Meckel's cartilage and the inferior dental nerve and its terminal branches, are important landmarks. Figure 5 is cut a little higher up than Figure 4. It shows the anterior end of Meckel's cartilage, M. C., in front of which is membrane bone, to the outer side of which is a nerve—the mental, M. N. This is succeeded by another strip of membrane bone, M. B., giving an appearance as if there were here two centers of ossification. These two patches of bone are continuous below the mental nerve, as in Figure 4, and appear as one strip thicker near the middle line than elsewhere.

From what one can see in Figures 4 and 5 and in the scheme (Fig. 6), it appears that ossification has commenced in front of the anterior expanded end of Meck-

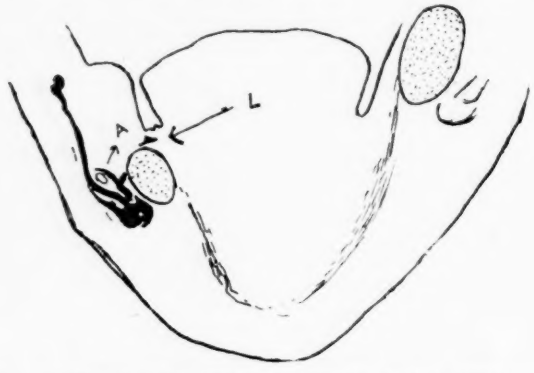

Fig. 14.—Showing formation of inferior dental canal at posterior end by a piece, A, growing outward from inner alveolar process. L. is the lingula.

el's cartilage and the incisive branch of the inferior dental nerve, and has extended backward under the mental nerve, M. N., as a strip of bone rapidly diminishing in thickness, and consequently looking more faintly stained than that near the middle line. It is in close relation with the antero-external aspect of the inferior dental nerve and its incisive branch. No trace of any bone is to be seen on the inner side of these nerves at this time. In other words, there is not at this time developed an internal alveolar border. This, however, very rapidly appears, and its method of ap-

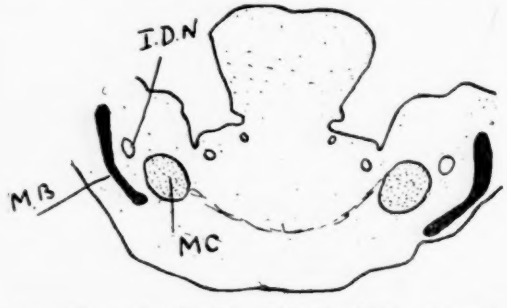

Fig. 15.—(Harvard collection, 819, N., 287.) Coronal section of 19 mm. embryo. I. D. N., inferior dental nerve; M. C., Meckel's cartilage; M. B., membrane bone.

pearance is of great importance, as it involves the question of the separate origin of that part of the bone. Some authors, whose observations have certainly not been based on serial sections, e. g., Spix, Cruveilhier, Renault and Rambaud and Sutton, describe a separate ossific center for the splenial, as Sutton calls it. We will be able to see, however, that this inner alveolar border does not commence in that way, but arises by ingrowth from the main mass just behind the mental nerve in the form of an obliquely directed shelf, which comes to a point behind the "lingula." This shelf insinuates itself between the inferior dental nerve and Meckel's cartilage, coming to a point behind, as already said, and overhanging there Meckel's cartilage. At no time is it completely separate from the main mass, and it is, therefore, not an independent element —in other words, there is no splenial center.

At first, there is no inner alveolar border behind the incisive nerve, but there grows backward over Meckel's cartilage and under the incisive nerve near its origin from the inferior dental nerve, a shelf. In Figure 7 (my own collection), this shelf, A. B., can be seen growing backward over Meckel's cartilage, M. C., and under a tooth germ (second incisor). The inner alveolar border, then, arises from the main mass in two ingrowths, first, one under the inferior dental nerve, which enlarges in the backward direction and ends ultimately at the lingula, the other growing under the outer end of the incisive branch of the inferior dental nerve and extending inward toward the middle line.

In Figure 8 (my own collection), a horizontal section of the head of a 42 mm. embryo, M. M. represents primitive membrane bone forming the outer alveolar border. M. N. is the mental nerve. I. is the canine tooth. A. is the posterior segment of the inner alveolar

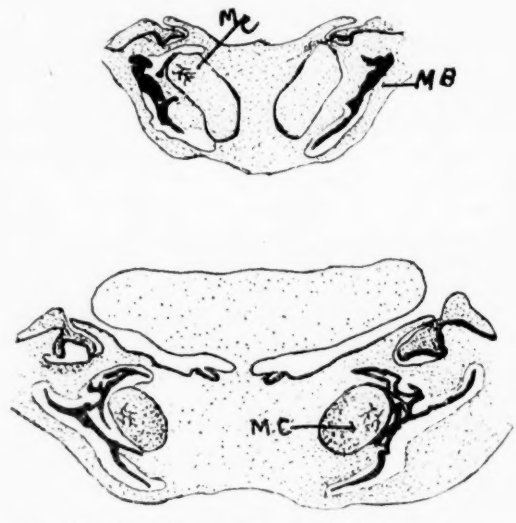

Fig. 16.—(a) Meckel's cartilage ossifying; M. B., membrane bone. (b) Shows upper and lower shelves, which ensheath Meckel's cartilage.

border much reticulated and, therefore, in an advanced state of ossification, whereas B is the anterior segment of that border existing only as a thin lamella and developing somewhat later. It will be to our advantage to examine a series of coronal sections of a 19 mm. embryo cut by Prof. Minot and corrected by others of a later date cut by him and by myself. If such be examined from before backward, very instructive views are obtained both of the manner of growth of the formative bony center and its subsequent extensions.

In Figure 9, one can see on each side of the middle line a mass of membrane bone which lies in front of the anterior expanded end of Meckel's cartilage and extends to the middle line, not, as Sutton thinks, stopping short at the mental nerve. He says that all that part of the mandible anterior to the mental foramen is ossified from Meckel's cartilage. This section, and others, notably one of the third month, cut horizontally, show that the membrane bone reaches to the middle line

(Figs. 9 and 8), and that Meckel's cartilage does not ossify as yet up to the middle line.

In Figure 10, we have still no inner alveolar border, the two cartilages of Meckel are altering their shape. M. C. is Meckel's cartilage. M. B. is membrane bone outside it. M. N. the mental nerve, and I. N. the incisive branch of that nerve.

In Figure 11, which is just in front of the mental foramen, one sees Meckel's cartilage more widely separated and more circular in form; on the outer side of them one sees the membrane bone M. B. jutting upward and outward between the mental and incisive nerves, M. N. and I. N. In the left half of the section, one can see the incisive nerve being enclosed in a canal—the incisive canal I. C. There is no inner alveolar border in this section. In Figure 12 the jaw is cut through at the mental foramen. The membrane bone here seems to be in two parts and one might think that there were two centers of ossification, but in the subsequent sections we will find that is not the case—M. B. is membrane bone, M. N. the mental nerve, and I. N. the incisive nerve. The two nerves here mark the mental foramen.

In Figure 13 the jaw is cut behind the mental foramen and one now sees an alveolar border passing up between the inferior dental nerve N. and Meckel's cartilage M. C., it is evidently a shelf and an outgrowth from the main mass. This inner alveolar border comes

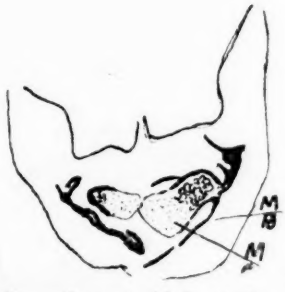

Fig. 17.—Coronal section at third month, showing ensheathing of Meckel's cartilage by membrane bone. M. C., Meckel's cartilage; M. B., membrane bone.

to a point behind, hence when cut coronally that point appears detached (Fig. 14, my own collection) and simulates a separate splenial.

Still further back (Fig. 15) the inner alveolar border has disappeared and the jaw is once more unilamellar, having to its inner side Meckel's cartilage, M. C., and the inferior dental nerve, I. D. N. Still further back one may see the condyle in a procartilaginous condition, but no drawing is given of this, the coronoid process is also evident, but quite thin and it can be seen to be an ossification of that fibrous blastema which lies like a wedge between the masseter and temporal muscles at this early stage of life; it is perhaps more in connection with the temporal muscle than the masseter that it is developed.

So far, then, we have seen a jaw consisting of Meckel's cartilage and a membrane bone, which stretches to the middle line in front, and behind the mental nerve gives off a shelf—the internal alveolar border. We have seen that the coronoid process, and for that matter too, the angle, are thin, and that the condyle is not yet ossified. Very soon this membrane bone increases in amount, it has already done so in front and where ossification first took place. Figure 6; it now thickens and becomes reticulated in the region of the angle, the top of the coronoid process and in that part of the inner alveolar border which is developed behind the nerve. It is now that those false impressions may arise from the employment of crude methods such as that of Sutton, who, removing one-half of the jaw from a fetus, immersed it in alcohol and cleared it with balsam and saw centers for "dentary," "condyle," and "coronoid," as well as a separate "splenial" center. Serial sections will show the falsity of conclusions drawn from the employment of such a method.

FURTHER CHANGES IN THE MEMBRANE BONE—THE FORMATION OF THE ROOF OF THE INFERIOR DENTAL CANAL.

This commences to be formed quite early in fetal life, in the neighborhood, first, of the mental nerve, then of the incisive branch of the inferior dental, and, considerably later, during the third month of fetal life it appears near the lingula. In each case, save that of the roof of the mental canal, it appears in the form of a spicule running from the inner alveolar wall to the outer. In Figure 11, Harvard collection, the incisive nerve can be seen lying in a canal or tunnel formed by a spicule of bone arching over it from what will become inner alveolar border to that which is the

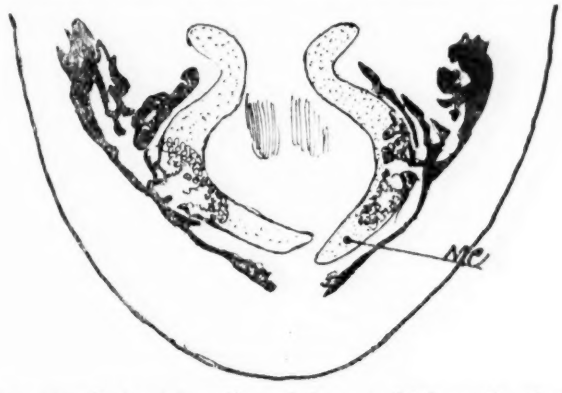

Fig. 18.—Horizontal section of jaw at third month, showing outward bend of Meckel's cartilage, M. C., and that cartilage undergoing ossification.

outer alveolar border. In Figure 14 (my own collection) there can be seen at A a spicule of bone which is growing outward over the inferior dental nerve to the outer bony lamella, and so covering over the nerve in the neighborhood of the permanent inferior dental foramen.

The inferior dental foramen is not, by the way, as Sutton would have us believe, formed at the junction of the coronoid angular, dentary, condyloid and splenial centers, for these centers are, for the most part, imaginary, certainly in the case of the coronoid, angular and splenial, and the condyle is so peculiarly formed as to be out of the question here. Sutton, too, would have us believe that the mental foramen is formed at the junction of his mento-Meckelian center, developed from Meckel's cartilage with the membrane bone which he calls dentary. We have seen that there is no such mento-Meckelian center such as Sutton describes and that the mental foramen is originally a groove on the top of the membrane bone which grows from before backward underneath the mental nerve.

In support of his theory with reference to the splenial center, Sutton quotes the mylohyoid nerve and states that it is shut off from the inferior dental by fusion of the "splenial" with the dentary. As a matter of fact, the mylohyoid nerve has reached its place be-

fore the inner alveolar border has grown to any extent backward.

FURTHER CHANGES IN THE MEMBRANE BONE.

These changes, so far as we are concerned here, involve its relation to Meckel's cartilage. Sections cut either coronally or horizontally show that Meckel's cartilage becomes invested with a covering of membrane bone, partly by ossification taking place in its sheath, partly by projecting shelves growing from the inner alveolar border and the undivided membrane bone below that. Then, in Figure 16—a, b—(my own collection), Meckel's cartilage can be seen to lie in a bony groove whose upper wall is from the inner alveolar border and the lower one from the main mass..

In Figure 17, ossification can be seen in the sheath of Meckel's cartilage. By the meeting of the upper and lower shelves and the fusion of the ossified sheath of Meckel's cartilage, the cartilage becomes included in front of the mental nerve within the jaw; behind the nerve it lies in a groove formed by similar shelves, which, however, never meet.

The septa between the tooth sockets are developed comparatively late in fetal life, that one behind the canine tooth appearing before the others. It can be very well seen in a four months' fetus. During this time, changes have been taking place in Meckel's cartilage itself.

OSSIFICATION OF MECKEL'S CARTILAGE.

About the tenth week of fetal life, ossification commences in Meckel's cartilage at a spot on its outer side corresponding with the site of the mental foramen, or

Fig. 19.—Scheme of left half of jaw, showing plug of cartilage, C., and mental foramen, M. F.

even a little internal to this, and nearer the upper than the lower border of the cartilage. This ossification extends gradually inward, but does not completely involve anterior end of Meckel's cartilage until the time of birth even, as evidenced by the presence of cartilaginous masses which are well known in this situation (Figures 16, 17, 18).

APPEARANCE OF ADDITIONAL CARTILAGES IN THE JAWS.

These are described in various places in the jaw. I have not myself seen all that have been described, but that is no reason for believing that they do not exist, the only question being their constancy. One, at least, of these cartilaginous masses is constant and it is of peculiar form, existing in the form of a plug, which enlarges to form the condyle proximally and tapers away distally to a point, having traversed the neck and root of the coronoid process of the jaw. This is shown in Figure 19, C being this plug of cartilage. It appears during the second and third months and very soon becomes calcified. It is enveloped everywhere except at the condyle by membrane bone and it becomes transformed into bone itself almost as soon as formed.

In Figure 20 (my own collection) one sees this cartilage undergoing ossification and being surrounded by a sheath of membrane bone; at the condyle B there is a part of cartilage as yet unossified and this is covered by a cap of fibrous tissue which, according to Hertwig, is permanent. This plug of cartilage has never any connection with Meckel's cartilage.

Recently, Dr. Low of Aberdeen,[19] in an excellent demonstration of the jaw ossification, showed a patch of cartilage along the anterior border of the coronoid process, but I do not know if that be constant. I, myself, have never met with it, but that may be because the material I have cut is too young.[20] Other patches are said to occur at the angle and at the outer alveolar border in the neighborhood of the incisor and canine teeth (Kollman).

CONCLUSIONS.

Having now examined various sections of the jaw and those of different ages, one may draw the following conclusions:

First.—The jaw in its ossification is not so complex as some would have us think, but it is for all that complex, involving (a) Meckel's cartilage at its anterior extremity, (b) the membrane on the outer side of Meckel's cartilage; (c) at least one accessory cartilage which is found in the condyle, neck and base of the

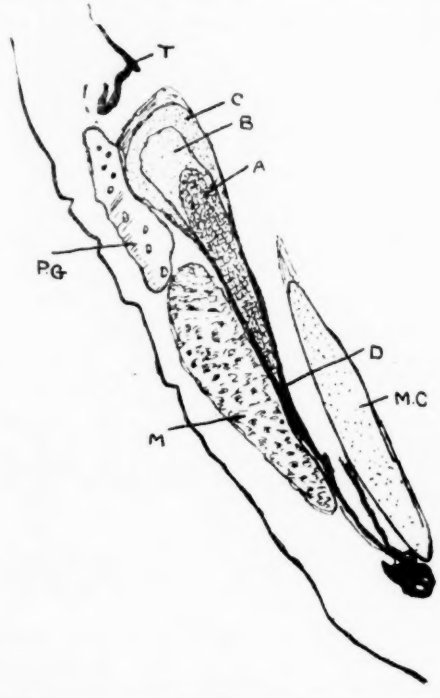

Fig. 20.—Horizontal section of three months head, through condyle and neck of jaw. D., ensheathing membrane bone; A., cartilage bone; P. G., parotid gland; M., masseter; M. C., Meckel's cartilage.

coronoid process of the jaw. These statements apply to each half of the jaw.

Second.—In order of sequence, ossification occurs first in the membrane between the mental nerve and the middle line and extends backward under the mental nerve. Next, ossification commences in Meckel's cartilage about the tenth week of fetal life in the region of the mental foramen and gradually extends inward. That part of the jaw then between the mental foramen and the symphysis is compound in origin, being partly cartilaginous, partly membranous, not entirely cartilaginous, as Sutton says. Finally, ossification takes

19. Proceedings of Anat. Soc. of Great Britain and Ireland, May, 1905.

20. Since this was written I have seen a specimen showing the cartilaginous strip along the anterior border of the coronoid process.

place in the accessory mass of cartilage in the condyle neck and root of the coronoid process at the third month.

Third.—There are no separate centers in membrane for either the coronoid process or for the angle or the so-called splenial, all these parts being outgrowths, as it were, from the main mass.

Fourth.—The inner alveolar border is developed in two parts by ingrowth from the main mass and at two different periods. That part behind the mental foramen appearing first and elongating from before backward, that part in front of the foramen appearing later and growing from behind forward.

Fifth.—The canal for the nerves is completed by the growth of spicules from one alveolar border to the other over the top of the nerves, the mental nerve being first so covered, then the incisive, and much later the inferior dental near the permanent inferior dental foramen.

Sixth.—The sockets for the teeth become bony comparatively late, that for the canine appearing first.

Seventh.—Meckel's cartilage becomes incorporated in the jaw anteriorly by the development of upper and lower shelves, which gradually close over it; behind the mental foramen these shelves do not meet, and Meckel's cartilage is consequently not included in the jaw, but gradually atrophies.

Eighth.—I do not think that Meckel's cartilage atrophies to form the internal lateral ligament of the jaw. This ligament at the fourth month can be seen quite distinctly in an ordinary dissection to be independent of Meckel's cartilage.

All the figures except 2, 6 and 7 are camera lucida drawings.

THE ANTI-MICROBIC ACTION OF IODIN.*

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CHICAGO.

(*Concluded from page 606.*)

STAPHYLOCOCCUS EXPERIMENTS.

The tables in Group 4 show the results of the experiments with cultures of *Staphylococcus pyogenes aureus:*

CONSIDERATION OF EXPERIMENTS WITH STAPHYLOCOCCUS.

1/1000 for *fifteen* minutes shows marked inhibitory effect. A and C show no growth throughout. On the second day B and D show fractional growth which increases gradually on the third and fourth days, when it equals less than ½ control growths.

1/1000 for *thirty* minutes gives a marked inhibitory effect. The first day there is no growth. On the second day A equals 1/6 control growth, B shows a point of growth, C is negative, and D gives 3/7 of control growth. On the third and fourth days B and C show simply a large point, while A and D give a gradual increase, equaling less than ½ control growth.

1/1000 for *sixty* minutes shows a marked inhibitory effect. On the first day there is no growth. On the second day A gives no growth, B and C give points, D equals control growth. On third and fourth days A shows no growth, B and C give no further development, D equals control growth.

1/500 for *fifteen* minutes shows an inhibitory effect. On the first day A, C, and D are without growth, B equals ½ control growth. On the second day the growth on experimental tubes equals 1/6 control growth. This growth increases slowly on the third and fourth days, when it equals 1/3 control growth.

1/500 for *thirty* minutes shows an inhibitory effect. A, C, and D show no growth the first day, while B equals 1/3 control growth. On the second day A, B, and C show less than ¼ control growth, D equals a point. On the third and fourth days D gives no further development, while A, B, and C show a gradual increase, which is less than ⅜ of control growth on the fourth day.

1/500 for *sixty* minutes exhibits an inhibitory effect. On the first day A, C, and D give no growth, B, equals ¼ control growth. On the second day A and B equal ¼ control growth, C shows a point and D shows no growth. On the third and fourth days A and B show rather rapid increase in growth, equaling ⅝ control growth on the fourth day. C shows a less rapid increase, equaling ¼ control growth. D shows points.

1/300 for *fifteen* minutes exhibits a marked inhibitory effect. On the first day there is no growth. On the second day A, C, and D give no growth, B equals 1/6 control growth. On the third and fourth days A and C show points, while B and D show slowly increasing growth, equaling about 1/3 control growth.

1/300 for *thirty* minutes shows a marked inhibitory effect. On the first and second days there is no growth. C and D show no growth throughout. On the third and fourth days A and B show a slightly increasing fractional growth, equaling about 1/7 control growth.

GROUP 4.—ACTION OF SOLUTIONS ON STAPHYLOCOCCUS PYOGENES AUREUS (FOUR-DAY-OLD CULTURES).

TABLE 52.—IODIN 1-1,000. EXPOSURE 15 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1	0	.5	0	.5	0	.5
2	0	1.5	.5	.7	0	1	.3	1
3	0	2.2	1	1.2	0	2	.6	1.5
4	0	3.5	1.2	2.5	0	3	1	3

TABLE 53.—IODIN 1-1,000. EXPOSURE 30 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1	0	.6	0	1	0	.5
2	.3	2	?	1.5	0	2	1	2.5
3	.5	3	?	2.5	?	3	1.2	3.5
4	1	3.5	?	3	?	3.5	2.2	4

TABLE 54.—IODIN 1-1,000. EXPOSURE 60 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1	0	1	0	.5	0	.3
2	0	1.5	?	2	?	1	1	1
3	0	2.5	?	2.5	?	2	2	1.5
4	0	3	?	3	?	2.5	2.5	2.5

TABLE 55.—IODIN 1-500. EXPOSURE 15 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1.5	.5	1	0	1.5	0	1.5
2	.2	3	1	2	.1	3	.1	3
3	.5	3.5	2.2	3	.5	4.5	.5	4
4	1	4	2.5	4	1	5	1.2	4.5

TABLE 56.—IODIN 1-500. EXPOSURE 30 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	2	.3	1	0	2	0	2
2	.1	3	.7	2	.5	3	?	3
3	.2	3.5	2	3	1	4.5	?	4
4	.5	4	2.5	4	1.5	5	?	5

TABLE 57.—IODIN 1-500. EXPOSURE 60 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	.6	.2	1	0	1.5	0	2
2	.5	2	.5	2	?	2.5	0	3
3	2	3.5	1	3	.2	4	?	4
4	3	4	2.2	4	1.2	5	?	5

TABLE 58.—IODIN 1-300. EXPOSURE 15 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	.5	0	1	0	1	0	.5
2	0	1.3	.3	2	0	1.5	0	1
3	?	3	1.2	3	?	2.5	.2	2.5
4	?	4	1.6	4	?	3.5	.3	3

TABLE 59.—IODIN 1-300. EXPOSURE 30 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1	0	.3	0	1	0	.2
2	0	1.5	0	1.5	0	1.5	0	1.2
3	.3	3	.2	2.5	0	2	0	2
4	.7	3.5	.6	3.5	0	3	0	3

TABLE 60.—IODIN 1-300. EXPOSURE 60 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	.7	0	.5	0	.5	0	1
2	0	1	0	1	0	1	0	2
3	.1	2.5	0	2	.1	2.7	.1	3
4	.3	4	0	3	.5	3.7	.7	4

TABLE 61.—IODIN 1-200. EXPOSURE 15 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1	0	.3	0	.3	0	1
2	0	2	0	1.5	0	1.5	0	2
3	0	3	0	3	0	2.5	0	3
4	0	4	0	4	0	3	0	4

TABLE 62.—IODIN 1-200. EXPOSURE 10 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	.5	0	1	0	.5	0	.1
2	0	2	0	2	0	3	0	1.5
3	0	3	0	2.5	0	4	0	3
4	0	4	0	3	0	4.2	0	3.5

TABLE 63.—IODIN 1-200. EXPOSURE 5 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1	0	.5	0	1	0	1
2	0	2	0	1	0	1.5	0	2
3	0	3	0	2.5	0	3	0	3.5
4	0	4	0	3.5	0	4	0	4

TABLE 64.—IODIN 1-200. EXPOSURE 4 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1.5	0	1	0	1.5	0	.5
2	0	2.5	0	2	0	2.5	0	1.5
3	0	3.5	?	3	.1	4.5	0	3
4	0	4.5	?	4	.5	5	0	4

* Work done as Fellow in Surgery at the Senn Laboratory, Rush Medical College.

1/300 for *sixty* minutes shows a marked inhibitory effect. On the first and second days there is no growth. On the third and fourth days A, C, and D show a small fractional growth which increases slightly, equaling 1/7 control growth on the fourth day. B shows no growth throughout.

1/200 for *fifteen* minutes shows no growth.

1/200 for *ten* minutes shows no growth.

1/200 for *five* minutes shows no growth.

1/200 for *four* minutes exhibits a very marked inhibitory effect, A and D showing no growth. On the third day B shows points of growth and C a small fractional growth. On the fourth day there is a slight increase in both B and C. B showing more points of growth, while C equals 1/10 of control growth.

SUMMARY OF EVIDENCE ON STAPHYLOCOCCUS.

The death of the *Staphylococcus pyogenes aureus* occurs after an exposure of five minutes to a 1/200 solution of iodin. A consideration of the inhibitory action shows that this effect begins after an exposure to a 1/1,000 solution for fifteen minutes, where it is quite marked. This effect, however, increases but slightly for the longer exposure to this strength and also for all exposures to the 1/500 solution. Irregularity in action is observed. On using the 1/300 solution the inhibitive effect shows a great augmentation over preceding strength, which increases irregularly for time of exposure. When we expose for less than five minutes to a 1/200 solution (the death point) marked inhibition, but not death, of micro-organism is observed.

STREPTOCOCCUS EXPERIMENTS.

The tables in Group 5 show the experiments with streptococcus cultures.

GROUP 5.—ACTION OF SOLUTIONS ON STREPTOCOCCUS PYOGENES (THREE-DAY-OLD CULTURES).

TABLE 65.—IODIN, 1-1,000. EXPOSURE 15 M.*

Day.	A	A′	B	B′	C	C′	D	D′
1	?	2	.3	2	?	2	?	1.7
2	?	3	.3	2.5	?	2.5	.1	2.5
3	?	3.2	.5	3	.2	3	.3	3
4	.6	3.5	.5	3.2	.3	3.3	.5	3.2

TABLE 66.—IODIN 1-1,000. EXPOSURE 30 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1.5	0	2	0	2	0	1.5
2	0	2.5	0	2.2	0	3	0	2.2
3	0	3.5	0	3	0	3.5	0	3
4	0	4	0	3.5	0	4	0	3.5

TABLE 67.—IODIN 1-500. EXPOSURE 10 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1.5	0	1	0	2	0	2
2	0	2.5	0	2.5	0	3	0	3
3	0	3	0	3.5	0	4	0	3.5
4	0	4	0	4	0	5	0	4

TABLE 68.—IODIN 1-500. EXPOSURE 5 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1	0	.5	0	1	0	1.5
2	0	1.5	0	1	0	2	0	2.2
3	0	3	0	2	0	3	0	3.5
4	0	3.5	0	3	0	3.5	0	4

TABLE 69.—IODIN 1-500. EXPOSURE 4 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1.5	0	1	0	1	0	1
2	0	2	0	1.5	0	1.3	0	1.7
3	0	3	0	2.5	0	2	0	2.5
4	0	4	0	3.5	0	3	0	3

* In the exp. tubes the growth was extremely thin and film-like, showing in A, B, C and D microscopically, poorly staining small streptococci, in comparison with the controls.

TABLE 70.—IODIN 1-500. EXPOSURE 3 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	.7	0	1.5	0	1	0	.5
2	0	2	0	2.5	0	2	0	1.5
3	0	3	0	3	0	3.2	0	3
4	0	4	0	3.5	0	3.5	0	4

TABLE 71.—IODIN 1-500. EXPOSURE 2 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1	0	1	0	1.2	0	1.5
2	0	2	0	2	0	2	0	2.5
3	0	3	0	3	0	3	0	3.5
4	0	3.5	0	4	0	3.5	0	4

TABLE 72.—IODIN 1-500. EXPOSURE 1 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
1	0	1	0	1.5	0	1	0	1
2	0	2	0	2.5	.5	2	0	2
3	0	3	0	3.5	1	3.2	0	3
4	0	4	0	4	2	3.5	0	3.5

CONSIDERATION OF EXPERIMENTS WITH STREPTOCOCCUS.

1/1000 for *fifteen* minutes shows an inhibitory effect. On the first day A, C, and D show points of growth, B 1/6 of control growth. On the second, third and fourth days there is a very slight, irregular increase in growth on experimental tubes. This growth equals about 1/6 control growth.

1/1000 for *thirty* minutes shows no growth.

1/500 for *ten* minutes shows no growth.

1/500 for *five*, *four*, *three*, and *two* minutes shows no growth.

1/500 for *one* minute exhibits marked inhibitory effect. A, B and D are free from growth throughout. On the second day C shows a fractional growth which increases rather rapidly on the third and fourth days, equaling 4/7 of the control growth at the end.

SUMMARY OF EVIDENCE ON STREPTOCOCCUS.

An exposure for two minutes to a 1/500 solution of iodin causes the death of *Streptococcus pyogenes*. The same result is obtained by using a 1/1000 solution for thirty minutes. A consideration of the inhibitory effect shows that this power is exhibited very markedly by a 1/1000 solution for fifteen minutes. Likewise, on exposing organism to a 1/500 solution for one minute, we find that an inhibitory power of medium degree is shown by one tube, while the others show death of organism. Therefore, it is evident that in the case of streptococcus pyogenes the sphere of inhibition is small because the relative points at which inhibition and death occur are almost identical.

BLASTOMYCOSIS EXPERIMENTS.

The experiments with blastomycosis cultures are detailed in Group 6.

CONSIDERATION OF EXPERIMENTS WITH BLASTOMYCOSIS.

1/1000 for *fifteen* minutes shows no effect.

1/1000 for *thirty* minutes shows no effect.

1/1000 for *sixty* minutes saows on the fourth day of real growth or second day of apparent growth a considerable inhibitory effect which, however, does not extend to the following day.

1/500 for *fifteen* minutes shows no growth.

1/500 for *ten*, *five*, and *four* minutes shows no growth.

1/500 for *three* minutes shows no growth on A, C, and D throughout. B is free from growth up to the fourth day of the actual growta or third day of real growth. At this point a very slight growth is noticed which increases very slowly to the tenth day, when it equals ¼ control growth.

1/500 for *two and one-half* minutes shows an inhibitory effect of markedly varying degree on the different tubes. C gives no growth throughout, D gives none up to the eighth day, when a unit of growth appears which increases progressively on the ninth and tenth days, equaling, on the tenth day, 1/3 control growth. A shows a marked inhibitory effect up to the seventh day, when it gives a rapid increase in growth. On the remaining days the experimental and control tubes are practically identical in growth. Likewise, B shows a marked inhibitory effect up to the fifth day, when experimental tube begins to increase rapidly, equaling control tube on the eighth, ninth and tenth days.

SUMMARY OF EVIDENCE ON BLASTOMYCOSIS.

Blastomyces is killed by an exposure of four minutes to a 1/500 solution of iodin. Here, more markedly than in preceding series, is the inhibitory effect of solutions employed shown to be of little consequence. In fact, in this series, it may be almost entirely disregarded, for it is shown only transitorily for one day by a 1/1000 solution for sixty minutes. In other words, there is practically no sphere of inhibition, the first effect shown being destruction of fungus. The exposures for three and two and one-half minutes simply bear out preceding statements, showing as they do either absolute death or markedly irregular inhibitory effect.

ACTINOMYCOSIS EXPERIMENTS.

The results of the experiments with cultures of actinomycosis are shown in the tables in Group 7.

CONSIDERATION OF EXPERIMENTS WITH ACTINOMYCOSIS.

1/1000 for *fifteen* minutes shows no inhibitory effect, especially on the second, third and fourth days. A and C are negative to the fifth day, when points appear. Likewise, on the fifth

day B equals 3/7 control growth and D gives points. From the fifth day on A and C show no further development, B increases rapidly to 2/3 control growth, and D slowly to 1/6 control growth.

1/1000 for *thirty* minutes shows a marked inhibitory effect. On the second, third and fourth days there is no growth. On the fifth day points appear on A, C, and D, which, to the end, increase very slightly. On the fifth day points of growth appear on B, which, on the remaining days, increases slowly, equaling at the end 1/12 of control growth.

1/500 for *ten* minutes shows an irregular effect. A and C are free from growth throughout. On the third day points of growth appear on B and D, which increase slowly to the ninth day, when B equals 2/7 of control growth and D 1/12 control growth.

1/300 for *ten* minutes gives no growth.

1/300 for *five* minutes shows a marked inhibitory effect. B and C show no growth throughout. On the sixth day points of growth appear on A. On the following days a very slight increase in growth is present, equaling, at the end,

GROUP 6.—ACTION OF SOLUTIONS ON BLASTOMYCOSIS (TEN-DAY-OLD CULTURES).

TABLE 73.—IODIN 1-1,000. EXPOSURE 15 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
3	?	?	?	?	?	?	?	?
4	1	1	1.5	2	1	1	1.5	2
5	1.2	1.5	3	3	1.2	2	2	2.5
6	1.5	2.2	3.5	3.5	1.2	3	2.5	3.5
7	2.7	3.5	4	4	2	4	3.5	4.5
8	4.2	4.2	5	5	4	5	5	5
9	4.7	4.5	5.5	5.5	4.2	5	5.5	5.2
10	5.2	5	6	6	5	5.5	6	6

TABLE 74.—IODIN 1-1,000. EXPOSURE 30 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
3	?	?	?	?	?	?	?	?
4	1	1	1.2	2	1	1	1.5	2
5	2	1.5	2.5	3	1.2	2	2	2.5
6	2.5	2.2	3	3.5	1.7	3	2.2	3.5
7	3	3.5	4	4	3	4	3	4.5
8	4	4.2	4.5	5	4.5	5	4	5
9	4.5	4.5	5	5.5	5	5	4.7	5.2
10	4.7	5	5.5	6	6	5.5	5.5	6

TABLE 75.—IODIN 1-1,000. EXPOSURE 60 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
3	?	?	?	?	?	?	?	?
4	.6	1	.6	2	.5	1	1	2
5	1.5	1.5	2	3	1	2	2.5	2.5
6	2	2.2	2.7	3.5	1.5	3	3	3.5
7	2.5	3.5	4	4	2.5	4	4	4.5
8	4	4.2	5	5	4	5	5	5
9	4.5	4.5	5.5	5.5	5	5	5.5	5.2
10	5.2	5	6	6	6	5.5	6.5	6

TABLE 76.—IODIN 1-500. EXPOSURE 15 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	.1	0	.1	0	.2	0	.2
4	0	.5	0	.5	0	.7	0	.7
5	0	2.2	0	1.2	0	1.5	0	2
6	0	3.5	0	3	0	2.5	0	3
7	0	4.5	0	4.5	0	3.5	0	4
8	0	5	0	5	0	4.5	0	4.5
9	0	5.5	0	5.5	0	5	0	5
10	0	6	0	6	0	5.5	0	5.5

TABLE 77.—IODIN 1-500. EXPOSURE 10 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	.5	0	.6	0	.5	0	.7
4	0	1	0	2	0	1.2	0	1.5
5	0	2.7	0	3	0	2.5	0	2.7
6	0	3.5	0	4	0	3	0	4
7	0	4	0	4.5	0	4	0	4.5
8	0	4.5	0	5	0	4.5	0	5
9	0	5.5	0	5.6	0	5	0	5.5
10	0	6	0	6	0	5.5	0	6

TABLE 78.—IODIN 1-500. EXPOSURE 5 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	1	0	1	0	1	0	1
4	0	1.7	0	2	0	2	0	1.5
5	0	3	0	3	0	3.5	0	2.5
6	0	3.5	0	4	0	4	0	2.7
7	0	4	0	4.5	0	4.5	0	3
8	0	5	0	5.5	0	5.5	0	4
9	0	5.5	0	6	0	6	0	4.5
10	0	6	0	6.5	0	6.5	0	5

TABLE 79.—IODIN 1-500. EXPOSURE 4 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	.5	0	?	0	.3	0	.3
4	0	1	0	.1	0	1	0	1.3
5	0	3	0	1.5	0	2.5	0	2.5
6	0	4	0	2	0	3.5	0	3.5
7	0	4.5	0	3	0	4.5	0	4.5
8	0	5	0	4	0	5	0	5
9	0	5.5	0	4.5	0	5.5	0	5.5
10	0	6	0	5	0	6	0	6

TABLE 80.—IODIN 1-500. EXPOSURE 3 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	.5	0	.1	0	.1	0	.5
4	0	1.5	?	1	0	1.5	0	2.5
5	0	2.5	?	2	0	2	0	3.5
6	0	3.5	?	3	0	3	0	4
7	0	4.5	?	4	0	4	0	5
8	0	5	.2	4.5	0	4.5	0	6
9	0	5.5	.7	5	0	5.5	0	6.5
10	0	6	1.2	5.5	0	6	0	7

TABLE 81.—IODIN 1-500. EXPOSURE 2½ MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	1	?	.5	0	1	0	1.2
4	?	2	.2	1.5	0	1.5	0	2.5
5	.2	3	1.2	2.5	0	2	0	3.5
6	1	4	2.5	3.5	0	2.5	0	4
7	3	5	4.5	5	0	3.5	0	4.5
8	5	5.5	5.5	5.5	0	4	1	5.5
9	5.2	6	5.7	5.7	0	4.5	1.5	6.5
10	5.5	7	6	6	0	5	2.5	7

GROUP 7.—ACTION OF SOLUTIONS ON ACTINOMYCOSIS BOVIS (SIX-DAY-OLD CULTURES).

TABLE 82.—IODIN 1-1,000. EXPOSURE 15 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	?	?	0	?	0	?
3	0	2	.7	2	0	2.5	?	1.5
4	0	2.5	1	2.5	0	3	?	2.5
5	?	3	1.5	3.5	?	4	?	3.5
6	?	4	3	4.5	?	4.5	?	4.5
7	?	4.5	3.5	5	?	5	.5	5
8	?	5	3.7	5.5	?	5.5	.6	5.5
9	?	5.5	4	6	?	6	1	6

TABLE 83.—IODIN 1-1,000. EXPOSURE 30 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	1.5	0	2	0	2	0	1
4	0	2	0	2.5	0	2.5	0	2
5	?	2.5	?	3	0	3.5	?	3
6	?	3	?	4	0	4.5	?	4
7	?	4	?	4.5	?	5	?	4.5
8	?	4.5	.2	5	?	5.5	?	5
9	?	5	.5	6	?	6	?	5.5

TABLE 84.—IODIN 1-1,000. EXPOSURE 60 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	1.5	0	2	0	2	0	1.5
4	0	2.5	0	3	0	2.5	0	2
5	0	3.5	0	3.5	?	3	?	2.5
6	0	4	?	4	?	4.5	?	3.5
7	0	4.5	?	5	?	5	?	4
8	0	5	?	5.3	?	5.5	.3	4.5
9	0	5.5	?	5.5	?	6	.5	5

TABLE 85.—IODIN 1-500. EXPOSURE 15 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	.2	0	.5	0	.5	0	1
4	0	.5	0	2	0	1	0	2
5	0	1	0	2.5	0	2	0	2.2
6	0	2	0	3.5	0	3.5	0	2.5
7	0	4	0	5	0	4	0	4
8	0	5	0	6	0	5	0	5
9	0	5.5	0	6	0	6	0	5

TABLE 86.—IODIN 1-500. EXPOSURE 10 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	2	?	1.5	0	1.5	?	1
4	0	3	.2	2.5	0	2.5	?	1.5
5	0	3.5	.6	3.5	0	4	?	2.5
6	0	4.5	1	4.5	0	5	?	4
7	0	5	1.3	5.5	0	5.5	?	5
8	0	5.5	1.7	6	0	5.7	.3	5.5
9	0	6	2	7	0	6	.5	5.7

TABLE 87.—IODIN 1-300. EXPOSURE 10 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	1	0	1.5	0	2	0	.6
4	0	1.5	0	2	0	2.5	0	1.5
5	0	2.5	0	3	0	3.5	0	2
6	0	3	0	4	0	4.5	0	3
7	0	4	0	4.5	0	4.7	0	4
8	0	4.5	0	5	0	5	0	5
9	0	5	0	6	0	5.5	0	5.5

TABLE 88.—IODIN 1-300. EXPOSURE 5 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	.5	0	1.5	0	1	0	1
4	0	1.5	0	2.5	0	2	0	2
5	0	2.5	0	3.5	0	2.5	?	3
6	?	3	0	4	0	3.5	?	3.5
7	?	3.5	0	5	0	4	?	4
8	?	5	0	5.5	0	4.5	?	4.5
9	.2	5.5	0	6	0	5	?	5

TABLE 89.—IODIN 1-200. EXPOSURE 5 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	2	0	1.5	0	2.5	0	1.5
4	0	3	0	2.5	0	3.5	0	2.5
5	0	3.5	0	3.5	0	4	0	3.5
6	0	4	0	4	0	4.5	0	4.5
7	0	5	0	4.5	0	5	0	5
8	0	5.5	0	5	0	6	0	5.5
9	0	6	0	5.5	0	6.5	0	6

TABLE 90.—IODIN 1-200. EXPOSURE 2 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	1.5	0	1	0	2	0	1
4	0	2.5	0	2	0	2.5	0	1.5
5	0	3.5	0	3	0	4	0	2.5
6	0	4.5	0	4	0	4.5	0	3.5
7	0	5.5	0	5	0	5	0	4
8	0	6	0	5.5	0	6	0	4.5
9	0	6.5	0	6	0	6.2	0	5

TABLE 91.—IODIN 1-200. EXPOSURE 1 MIN.

Day.	A	A′	B	B′	C	C′	D	D′
2	0	?	0	?	0	?	0	?
3	0	1	0	1.5	0	.5	0	1
4	0	2	0	3	0	1	0	1.5
5	0	3	0	3.5	0	2	0	2.5
6	0	4	0	4.5	0	3	0	3.5
7	0	4.5	0	5	0	4	0	4
8	0	5	0	5.5	0	5	0	4.5
9	0	5.5	0	6	0	6	0	5

1/1000 for *sixty* minutes gives a marked inhibitory effect. On the second, third and fourth days there is no growth. A is free from growth throughout. On the fifth and sixth days points appear on B, C and D. On the following days B shows no increase in growth, C gives a few more points, and D, on the eighth and ninth days gives a fractional growth, equaling 1/10 control growth at the end.

1/500 for *fifteen* minutes gives no growth.

1/16 of control growth. On the fifth day points appear on D, which increase but slightly on the remaining days.

1/200 for *five* minutes shows no growth.

1/200 for *two* minutes shows no growth.

1/200 for *one* minute shows no growth.

SUMMARY OF EVIDENCE ON ACTINOMYCOSIS.

The evidence shows that *Actinomyces bovis* is de-

stroyed by either of several strengths solution of iodin acting for varying periods of time. Thus, death occurs after an exposure to a 1/500 solution for fifteen minutes; to a 1/300 solution for ten minutes; to a 1/200 solution for one minute. Considering the inhibitive effect of the solutions on the micro-organism, we find that this power begins to appear quite perceptibly on exposing to a 1/1000 solution for fifteen minutes. This effect is increased in proportion as the time of exposure is lengthened. On exposing to solutions of greater strength for a shorter period than is necessary to cause death, i. e., 1/500 solution for ten minutes, 1/300 solution for five minutes, the inhibitory effect becomes, to a medium degree, greater and greater, although time of exposure is markedly decreased. Therefore, in this series, we may consider that iodin has a medium range of inhibition before causing death.

GENERAL SUMMARY.

In summing up the antimicrobic power possessed by iodin in solution, it is well for clearness to adhere to the two divisions previously made. These were: (1) The death point of the micro-organisms as expressed by the strength of solution employed and the time of exposure to same; (2) the inhibitory effect of solutions as expressed by retardation and limitation of growth. Taking for consideration the first division, the evidence shows that absolute destruction of the several micro-organisms occurs when they are exposed to the solutions as given in Table 92.

Micro-organism.	Strength of solution.	Time of exposure.
Streptococcus pyogenes	1/1000	30 minutes
	1/500	2 minutes
Blastomycosis	1/500	4 minutes
Actinomycosis bovis	1/500	15 minutes
	1/300	10 minutes
	1/200	1 minute
Staphylococcus pyogenes aureus	1/200	5 minutes
Bacillus tuberculosis	1/200	60 minutes
	1/100	7 minutes
Bacillus anthracis plus spores	1/200	60 minutes
	1/100	10 minutes
Bacillus prodigiosus	1/100	10 minutes

A considerable range in efficiency of solutions is shown to exist between the *Streptococcus pyogenes* and the *Bacillus prodigiosus*. On the *Streptococcus pyogenes* the effect of the iodin is almost, if not altogether, a specific. The same, to a lesser degree, may be said of its action on *Blastomyces*. As per the arrangement of the table, the *Staphylococcus pyogenes aureus* is seen to occupy, in its relation to resisting power, a middle position. In regard to this same power of resistance, a wide space intervenes between the *Staphlycoccus aureus* and the bacilli group, of which the non-pathogenic prodigiosus is the most hearty. However, the employment of the strongest solution necessary (1 per cent. for ten minutes) is eminently practicable in direct application to wound surfaces without bad effects resulting. The fact that a micro-organism is or is not pathogenic has no weight in determining its power of resistance.

Taking for consideration the second division, it is readily seen that the degree of inhibition depends both singly and jointly on the strength of solution employed and the duration of exposure to the same. This inhibitory cycle is well shown by the bacilli group where there is a gradual and progressive increase in the inhibitory power over a wide range as the solutions become stronger and stronger and the time of exposure is increased in each strength. On this group iodin has a marked range of inhibition before producing death. The inhibitory sphere in *Staphylococcus pyogenes aureus* is irregular in character and much smaller because of the lesser strength of solution causing death. Likewise, for the same cause, *Actinomyces* presents a still more restricted sphere, although steadily progressive in character. On both *Streptococcus pyogenes* and *Blastomyces* the range of inhibition is so minute, because the death and inhibitory points are practically the same, that it may be disregarded.

CONCLUSIONS.

1. In a solution of iodin, varying from a 0.2 per cent. to a 1 per cent., we have a germicidal agent of very marked potency.

2. Its germicidal power is far superior to that of bichlorid of mercury, the acknowledged leader of all other antiseptics. This fact was shown by experiments made with a 1/1000 solution of bichlorid of mercury on *Streptococcus pyogenes*, using the same method employed with iodin solution. It was found that an exposure of fifteen minutes, although showing considerable inhibitory power, especially on the first day, permitted a good growth of streptococci to appear. An exposure of thirty minutes gave no growth. The superiority of iodin is readily evidenced by recalling the fact that a comparatively weak solution of iodin, i. e., 0.2 per cent., gave death after two minutes' exposure.

3. It approaches nearly to the ideal antiseptic in that:

(a) It is easily prepared and is stable.

(b) It is non-toxic and non-irritating in strength effective, being only one-fourth as toxic as bichlorid of mercury.

(c) It does not coagulate albumin or form inert compounds with tissues.

(d) It is effective in a very brief time.

(e) The stain it produces soon disappears.

(f) Lastly, and most important, it possesses a remarkable penetrating power.

4. In conclusion, it is well to state that an 0.5 per cent. solution is amply strong enough for all practical usage.

390 North Clark Street.

THE UNITED STATES PHARMACOPEIA.

THE ADVANCE IN PHARMACY INDICATED IN THE EIGHTH DECENNIAL REVISION.*

C. S. N. HALLBERG, PH. G., M.D.

CHICAGO.

The Pharmacopeia was made public June 27, when unbound copies of the book were sent to medical and pharmaceutical journals, medical publishers, authors, and such other persons to whom avoidance of the two weeks' delay in securing bound copies of the volume would be especially appreciated.

THE NOMENCLATURE.

The Pharmacopeia, as the exponent of the science of drugs and medicine, must employ a terminology in harmony with the related sciences, hence the importance of the nomenclature. With reference to the nomenclature the convention adopted the following among the general principles to be followed in revising the Pharmacopeia:

It is recommended that changes in the titles of articles at present official be made only for the purpose of insuring greater accuracy or safety in dispensing. In the case of newly admitted articles it is recommended that such titles be chosen as are in harmony with general usage and convenient for prescrib-

* Read in the Section on Pharmacology of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

ing; but in the case of chemicals of a definite composition a scientific name should be given, at least a synonym.

It is recommended that every common name and English title of articles used in the present United States Pharmacopeia that is synonymous for both the medicinal and commercial drug be either discarded or modified so as to leave no doubt as to what is wanted.

With reference to the chemical nomenclature, that of the former revision has been retained notwithstanding the fact that the spelling adopted by the American Association for the Advancement of Science and chemical societies has met with some degree of favor. The deletion of the final *e* in the halogens and alkaloids, such as "bromine," "iodine" and "morphine" and "quinine," respectively, it was thought, would prove confusing; besides, the alkaloids would lose the distinction they have always enjoyed in being written with the final *e*, from the glucosids without it, i. e., aloin, santonin, etc. So also was the substitution of *f* for ph in the case of sulphur and sulphates (sulfates), regarded probably as too much of an innovation, especially when the spelling of "Pharmacopœia" was considered. The spirit of conservatism was so evident that the convention refused even to eliminate the *o* in the spelling of "Pharmacopœia," although the British is the only other Pharmacopeia which retains this ancient spelling.

Another innovation was narrowly averted when the figures for the elements of the International Committee on Atomic Weights of 1904 were adopted, based on hydrogen at 1 instead of oxygen at 16, which would have made H 1.008. The fear of innovation did not deter the committee, however, from making some timely corrections in chemical terms, such as changing the official titles for three well-known acids: carbolic, arsenous and chromic to phenol, arseni-trioxidum and chromi-trioxidum respectively; resorcinol for resorcin, potassii hydroxidum for potassa, sodii hydroxidum for soda, the *id* termination for salts of alkaloids, i. e.: cocainæ hydrochloridum for cocainæ hydrochloras, the contracted term "fluidextractum" for extractum-fluidum, and the less doubtful substitution of chloralum hydratum for chloral as being liable to confusion with chlor. hydr., when carelessly abbreviated.

PURITY AND STRENGTH OF PHARMACOPEIAL ARTICLES.

The limitations on the purity and strength of pharmacopeial articles have received much consideration, especially during the past decade, because of the extreme requirements, in some instances characterized as hypercritical by manufacturers. Having in mind, no doubt, the greatest protection to the public, the convention gave the following instruction:

The committee is instructed to revise as carefully as possible the limits of purity and strength of the pharmacopeial chemicals and preparations for which limiting tests are given. While no concession should be made toward a diminution of medicinal value, allowance should be made for unavoidable, innocuous impurities or variations due to the particular source or mode of preparation, or to the keeping qualities of the several articles. In the case of natural products, the limits of admissible impurities should be placed high enough to exclude any that would not be accepted by other countries.

To the present revision, therefore, has been added a descriptive definition for each chemical known as the "purity rubric," which defines and limits the gross amount of impurities in each article by stating, for example, potassii iodidum: "It should contain not less than 99 per cent. of pure potassium iodide (KI=164.76)."

To make this article 100 per cent. pure would not only add vastly to the cost but in this particular salt would result in a product which would be stable. In the elaborate tests which follow, the amounts of alkali, nitrates and nitrites, chlorids and bromids are carefully limited within the total one per cent. permissible, while they absolutely exclude all noxious salts, such as barium, cyanid and heavy metals, lead, tin, zinc, etc. By this method, the highest practically attainable degree of purity is secured with the certainty that all noxious impurities are absent.

ASSAY PROCESS.

The standardization of drugs and their preparations also for certain principles has long been a desideratum. The medical profession has especially favored this idea because it represented an apparently decided advance in therapeutics. It was also in line with the entire spirit of the Pharmacopeia, and the ideals of pharmacy, viz.: to secure uniformity in strength and dosage. Its application, however, was an entirely different and much more difficult proposition than fixing the uniformity of chemical substances from the fact that the principles of but comparatively few drugs are as well defined as ordinary chemical substances, and their identity and determination, therefore, require much more careful and elaborate study. For this reason the committee was instructed:

The committee is instructed to append assay processes to as many of the potent drugs and preparations made therefrom as may be found possible, provided that the processes of assay are reasonably simple (both as to methods and apparatus required) and lead to fairly uniform results in different hands. As regards the products of such assays, tests of identity and purity should be added wherever feasible. Physiologic tests for determining strength should not be introduced by the committee.

After exhaustive study by a committee of specialists, some of whom have been engaged with the various large manufacturing pharmaceutical houses, assay processes were introduced for eighteen drugs and their preparations, and the following standards have been adopted for them:

Drugs and their preparations for which standards of active principles are required by the U. S. P. VIII.

Preparation.	Principle.	Minimum.
Aconitum	Aconitin	0.5 per cent.
Fluidextractum	Aconitin	0.4 in 100 c.c.
Tinctura	Aconitin	0.045 in 100 c.c.
Belladonnæ folia	Mydriatic alkaloids	0.35 per cent.
Emplastrum	Mydriatic alkaloids	0.38-0.42 per cent.
Extractum	Mydriatic alkaloids	1.4 per cent.
Tinctura	Mydriatic alkaloids	0.035 per cent.
Belladonnæ radix.	Mydriatic alkaloids	0.5 per cent.
Fluidextractum.	Mydriatic alkaloids	0.5 in 100 c.c.
Cinchona	Alkaloids	4 per cent. ether soluble.
Fluidextractum.	Alkaloids anhydrous	4 in 100 c.c.
Coca	Alkaloids ether soluble	0.5 per cent.
Fluidextractum.	Alkaloids ether soluble	0.5 per cent.
Colchici cormus	Colchicin	0.5 per cent.
Extractum	Colchicin	1.4 per cent.
Colchici semen	Colchicin	0.55 per cent
Fluidextractum.	Colchicin	0.5 in 100 c.c.
Tinctura	Colchicin	0.05 in 100 c.c.
Conium	Conin	0.5 per cent.
Fluidextractum.	Conin	0.45 in 100 c.c.
Guarana	Alkaloids	3.5 per cent.
Fluidextractum.	Alkaloids	3.5 in 100 c.c.
Hydrastis	Hydrastin	2.5 per cent.
Fluidextractum.	Hydrastin	2 in 100 c.c.
Tinctura	Hydrastin	0.4 in 100 c.c.
Hyoscyamus	Mydriatic alkaloids	0.08 per cent.
Extractum	Mydriatic alkaloids	0.3 per cent.
Fluidextractum.	Mydriatic alkaloids	0.075 in 100 c.c.
Tinctura	Mydriatic alkaloids	0.007 in 100 c.c.
Ipecacuanha	Alkaloids	2 per cent.
Fluidextractum.	Alkaloids	1.75 in 100 c.c.
Jalapa	Alcol soluble resin	8 per cent.
	Ether soluble resin	1.5 per cent.
Nux vomica	Strychnin	1.25 per cent.
Extractum	Strychnin	5 per cent.
Fluidextractum.	Strychnin	1 in 100 c.c.
Tinctura	Strychnin	0.1 in 100 c.c.

Opium pulvis and deodorata	Morphin cryst	12 to 12.5 per cent.
Extractum	Morphin cryst	20 per cent.
Tinctura and deodorized tinctura	Morphin cryst	1.2 to 1.25 in 100 c.c.
Physostigma	Ether soluble alkaloids	0.15 per cent.
Extractum	Ether soluble alkaloids	2 per cent.
Tinctura	Ether soluble alkaloids	0.014 in 100 c.c.
Pilocarpus	Alkaloids	0.5 per cent
Fluidextractum	Alkaloids	0.4 in 100 c.c.
Stramonium	Mydriatic alkaloids	0.35 per cent.
Extractum	Mydriatic alkaloids	1.4 per cent.
Fluidextractum	Mydriatic alkaloids	0.35 in 100 c.c.
Tinctura	Mydriatic alkaloids	0.03 in 100 c.c.

The introduction of several principles of volatile oils, some artificial or synthetized, led to the fixing of standards for a number of the natural volatile oils, which are required to be of the following strengths:

Oil.	Principle.	Strength.
Oleum amygdalæ amaræ	Benzaldehyd	85 per cent. w't.
	Hydrocyanic acid	2.4 per cent. w't.
Oleum cajupti	Cineol	55 per cent. vol.
Oleum caryophilli	Eugenol	80 per cent. vol.
Oleum cinnamomi	Cinnamic aldehyd	75 per cent. vol.
Oleum eucalypti	Cineol	50 per cent. vol.
Oleum limonis	Citral	4 per cent. w't.
Oleum menthæ piperitæ	Menthyl acetate	8 per cent. w't.
	Total menthol	50 per cent. w't.
Oleum pimentæ	Eugenol	65 per cent. vol.
Oleum rosmarini	Bornyl acetate	5 per cent. w't.
	Total borneol	15 per cent. w't.
Oleum santali	Santalol	90 per cent. w't.
Oleum thymi	Phenols	20 per cent. vol.

In addition to this class of principles, already official menthol, thymol and methyl salicylate, the following have also been introduced:

BENZALDEHYDUM: An aldehyd obtained from the volatile oil of bitter almond or produced artificially, containing 85 per cent. pure benzaldehyd.

CINNALDEHYDUM: An aldehyd obtained from oil of cinnamon or prepared synthetically, containing not less than 95 per cent. pure cinnamic aldehyd.

EUGENOL: An unsaturated aromatic phenol obtained from oil of cloves and other sources.

SAFROLUM: The methylene ether of pyrocatechol, found in oil of sassafras, camphor oil and other volatile oils.

The difficulty presented in work of this branch of organic chemistry may be realized from the fact that of these eighteen drugs not one glucosidal drug is included, they being, with one exception, (jalap) alkaloidal. While to devise assay processes which would be practicable and which, in the hands of the average skilled pharmacist, would show fairly uniform results, was exceedingly difficult with some of these, notably the mydriatic group, with glucosidal drugs these difficulties were unsurmountable. For this reason, there are no assay processes nor standards for the principles of digitalis, ergot, strophanthus and several more of this class, much as it was desired to include them. By far the largest number of drugs are glucosidal in character and yet, with a few exceptions, they are but little known. There are many drugs indigenous to North America, not to mention Central and South America, whose principles, if studied systematically, would furnish valuable therapeutic agents, perhaps equally as valuable as the coal-tar and other synthetic chemicals. This field may well be called a *terra incognita* which lies fallow for a medical Vespuccio or Vasco de Gama, but more likely which will be chartered and explored by the *omnium gatherum* Teutons when they have exhausted the possimilities of the Benzene ring and its congeners.

Owing to the lack of chemical assay methods for standardizing some of these drugs, certain manufacturers have adopted so-called physiologic methods for determining the strength and potency. Since no method based on pharmaco-dynamic effects could be applied by the average retail pharmacist for whom the U. S. Pharmacopeia is, first of all, designed, and since any requirement for an article which could not be verified by him would, it was contended, violate this fundamental principle of the Pharmacopeia, it was recommended "that physiologic tests should not be introduced."

Owing to the importance of the subject, however, and with the aid of a special committee composed of Major Walter Reed, surgeon U. S. A., Prof. Theobald Smith, Thomas C. Craig, surgeon U. S. A., H. A. Hare, E. M. Houghton, J. J. Kinyoun, William H. Park, Herbert D. Pease, and M. J. Rosenau, surgeon U. S. Public Health and Marine-Hospital Service, the following standard was adopted:

SERUM ANTIDIPHTHERICUM—Antidiphtheric serum. Diphtheria antitoxin.

A fluid separated from the coagulated blood of a horse *Equus caballus* (Linnè), immunized through the inoculation of diphtheria toxin. It should be kept in sealed glass containers, in a dark place, at temperatures between 4.5 and 15 C. (40 and 59 F.).

A yellowish or yellowish brown, transparent or slightly turbid liquid, odorless or having a slight odor, due to the presence of the antiseptic used as a preservative.

Specific gravity: 1.025 to 1.040 at 25 C. (77 F.).

Antidiphtheric serum gradually loses its power, the loss in one year varying between 10 and 30 per cent. Each container should be furnished with a label or statement, giving the strength of the antidiphtheric serum, expressed in antitoxic units, the name and percentage by volume of the antiseptic used for the preservation of the liquid (if such be used), the date when the antidiphtheric serum was last tested, and the date beyond which it will not have the strength, indicated on the label or statement.

The standard of strength expressed in units of antitoxic power should be that approved or established by the United States Public Health and Marine-Hospital Service.

Average dose, 3,000 units.

Immunizing dose for well persons, 500 units.

The admission of the synthetics, owing to the complex status of many of them, was a difficult problem to solve. The attitude of the convention was not sharply outlined in the following instruction to the committee:

The Committee of Revision is authorized to admit into the Pharmacopeia any product of nature of known origin, also any synthethized product of definite composition which is in common use by the medical profession, the identity, purity or strength of which can be determined. No compound or mixture shall be introduced if the composition or mode of manufacture thereof be kept secret, or if it be controlled by unlimited proprietary or patent rights.

Realizing the desire on the part of the medical profession to have, at least, made official as many of this class of articles as have proved of therapeutic value and have assumed a permanent place in the materia medica, the committee compromised by admitting such products for which the patent on the process or product, or both, expired or will expire during the present decade (1910), provided that, by such expiration, the trade name would also become free.

With this as a guide, the legal status of the most extensively employed synthetics was investigated, and those which would be free during the stated period were admitted. Some omissions will be noted, for example, ichthyol, which is not covered by any patent, the name alone being registered, and the article, therefore, is in the category of so-called patent medicines, except that its composition is well known.

Except in the case of antipyrin, which became free several years ago, the trade names of these articles have not been admitted, but instead more or less euphonious contractions of the chemical names have been adopted

for their title, together with the chemical structural names, as follows:

ACETPHENETIDIUM—Acetphenetidin: $C_{10}H_{13}NO_2 = 177.79$.

A phenol derivative [Acetparaphenetidin $C_6H_4(OC_2H_5).NH.(CH_3CO1:4$] the product of the acetylization of para-amido phenol.

Average dose, 0.500 gm., 500 milligrams (7½ grains).

ÆTHYLIS CARBAMAS—Ethyl Carbamate: $C_3H_7NO_2 = 88.42$.

An ester of carbamic acid [$CO(OC_2H_6)NH_2$] obtained by the reaction of ethyl alcohol on urea (carbamide) or one of its salts. It should be kept in well-stoppered bottles.

Average dose, 1 gm. (15 grains).

ANTIPYRINA—Antipyrin: $C_{11}H_{42}N_2O = 186.75$.

Phenyldimethylpyrazolon [$C_3HN_2O(CH_3)_2C_6H_5$], obtained by the condensation of phenylhydrazin with aceto-acetic ether, and methylation of the product.

Average dose, 0.25 gm., 250 milligrams (4 grains).

BENZOSULPHINIDUM—Benzosulphinid Saccharin.

$$C_6H_4 \begin{matrix} SO_2 \\ CO \end{matrix} NH = 181.77$$

The anhydrid of ortho-sulphamide-benzoic acid (benzoyl sulphonicimide).

Average dose, 0.200 gm., 200 milligrams (3 grains).

CHLORALFORMAMIDUM—Chloralformamid: $C_3H_4Cl_3NO_2 = 190.96$.

A crystalline solid [$CCl_3.CH(OH)NH.COH$], made by the direct union of formamide with anhydrous chloral. It should be kept in amber-colored, well-stoppered vials.

Average dose, 1 gm. (15 grains).

GUAIACOLIS CARBONAS—Guaiacol Carbonate: $(C_7H_7O)_2CO_3 = 272.05$.

A guaiacol derivative [$(C_6H_4(OCH_3)O)_2.CO$], obtained by the action of carbonyl chlorid on sodium-guaiacolate.

Average dose, 1 gm. (15 grains).

HEXAMETHYLENAMINA—Hexamethylenamin: $C_6H_{12}N_4 = 139.18$.

A condensation product [hexamethylene-tetramin, $(CH_2)_6N_4$], obtained by the action of ammonia on formaldehyd. It should be kept in well-stoppered bottles.

Average dose, 0.250 gm., 250 milligrams (4 grains).

HOMATROPINÆ HYDROBROMIDUM—Homatropin hydrobromid: $C_{16}H_{21}NO_3.HBr = 353.49$.

The hydrobromid [$HBr.C_{16}H_{21}NO_3$] of an aklaloid obtained by the condensation of tropin and mandelic acid. It should be kept in well-stopered vials, protected from light.

Average dose, 0.0005 gm., 0.5 milligram (1/128 grain).

IODOLUM—Iodol: $C_4I_4.NH = 566.17$.

Tetraiodopyrrol, a derivative of the base pyrrol, obtained by the direct action of iodin on the base in the presence of alcohol. Iodol should be preserved in amber-colored bottle, protected from light.

Average dose, 0.250 gm., 250 milligrams (4 grains).

METHYLTHIONINÆ HYDROCHLORIDUM—Methylthionin Hydrochlorid. Methylen Blue: $C_{16}H_{18}N_3SCl = 317.36$.

Tetramethylthionin hydrochlorid, obtained by the action of hydrogen sulphid on an oxidation product of paramidodimethylanilin.

Average dose, 0.250 gm., 250 milligrams (4 grains).

SULPHONETHYLMETHANUM—Sulphonethylmethane: $C_8H_{18}S_2O_4 = 240.46$.

Di-ethyl-sulphone-methyl-ethyl-methane [$(CH_3)(C_2H_5)C(SO_2C_2H_5)_2$], a product of the oxidation of the mercaptol obtained by the condensation of methylethylketone with ethyl mercaptan. It should be preserved in well-stoppered vials.

Average dose, 1 gm. (15 grains).

SULPHONMETHANUM — Sulphonmethane: $C_7H_{16}S_2O_4 = 226.55$.

Diethylsulphonedimethylmethane [$(CH_3)_2C(SO_2C_2H_5)_2$], the product of the oxidation of the mercaptol obtained by the condensation of acetone with ethylmercaptan. It should be preserved in well-stoppered vials.

Average dose, 1 gm. (15 grains).

THYMOLIS IODIDUM—Thymol Iodid: $C_{20}H_{24}O_2I_2 = 545.76$.

Dithymol-diiodid [$(C_6H_2.CH_3.C_3H_7.OI)_2$], obtained by the condensation of two molecules of thymol and the introduction of two atoms of iodin into the phenolic groups of thymol; it contains 45 per cent. of iodin. Thymol iodid should be kept in amber-colored vials, protected from the light.

VANILLINUM—Vanillin: $C_8H_8O_3 = 150.92$.

Methylprotocatechuic aldehyd [$C_6H_3OH.OCH_3COH$ 4:3:1], occurring naturally in vanilla or made artificially from several orthodihydroxybenzene derivatives.

Average dose, 0.030 gm., 30 milligrams (½ grain).

Special Articles

IMMUNITY.

CHAPTER XXIV.

BACILLUS ENTERITIDIS IN MEAT POISONING.

More or less extensive epidemics of poisoning by meats have long been known. Whereas, it was formerly thought that the intoxication was due to ptomains which were formed as an incident to putrid decomposition of meat, it is now well established that most epidemics of this character are caused by meats which are infected with bacteria which are pathogenic even when entirely freed from decomposing proteids.

Botulism has already been described as a special form of meat poisoning in which nervous symptoms predominate, and it has also been emphasized that paratyphoid fever may have its source in infected meat.

The "Enteritidis Group."

Before these conditions were recognized, however, Gärtner in 1888 had the opportunity of studying an epidemic caused by the meat of a cow which had been slaughtered in extremity. The symptoms differed from those of botulism or paratyphoid, as described below. He obtained from the muscle and spleen of the cow, and from the spleen of a man who had been fatally poisoned by meat, an organism which has since been known as *Bacillus enteritidis* (Gärtner). The same bacillus, or organisms which resemble it closely, have been obtained repeatedly during similar epidemics, both from the suspected meat and from the organs in fatal cases (intestines, blood, spleen, etc.). Drigalski, from a comparative study of several strains which had been obtained from different sources, concluded that all are members of a closely related group of organisms, the group of *Bacillus enteritidis*. His conclusions were based on cultural properties and agglutination tests.

The typical organism is a short rod, often ovoid in shape; it possesses four to twelve long flagellæ and has moderate motility. It is not stained by Gram's method. It ferments dextrose and certain other sugars, lactose, galactose, maltose, cane sugars, etc., with gas formation. Variations among individual strains need not be discussed here.

According to v. Ermengem, and also Drigalski, the pathogenicity of the organism depends on its elaboration of a soluble but heat resistant toxin.

Pathogenicity.

Bouillon cultures twelve days old, in which the bacteria have been killed by heat, also similar cultures from which the bacteria have been removed by filtration, are toxic for mice and guinea-pigs (Drigalski). It is noteworthy, however, that relatively large quantities of the bouillon were necessary to kill guinea-pigs (4.0 c.c.), which is in contrast to the toxins of diphtheria and tetanus. The rapidity with which symptoms develop following the ingestion of infected meat is a further indication of the existence of this soluble toxin. Symptoms occasionally develop so quickly as to suggest some strong metallic poisoning. Within a few hours vomiting, violent diarrhea and colicky pains set in, followed by more or less collapse, weakness, headache and not uncommonly by trythematous, urticarial or herpetic eruptions. Fever is absent or inconspicuous. The mortality is not high, from 2 to 5 per cent., although convalescence is said to be slow. Nephritis and catarrhal pneumonia have been noted as

Symptoms.

sequelæ. Autopsy shows the anatomic changes of an acute gastroenteritis, sometimes of hemorrhagic character, with swollen Peyer's patches; the large intestine is not greatly involved. The spleen may be swollen and the kidneys degenerated. The anatomic findings are not specific.

It has been shown conclusively in numerous instances that the meat infection takes place *intra vitam*, that is, that the cattle or horses (Drigalski) were sick with an intestinal or general infection with *Bacillus enteritidis* before they were slaughtered. "In a very large number of cases it can be demonstrated that the animals from which the meat was taken had been slaughtered in extremity and had died rapidly, and indeed, that they had (in certain instances), died before they could be slaughtered. Most often they suffer from septic inflammatory processes or from traumatic, puerperal or other sorts of septicemia, or from other ill defined pathologic conditions which are accompanied by symptoms of enteritis or intestinal or pulmonary inflammations." (v. Ermengem.) Subsequent infection of the meat by *Bacillus enteritidis*, i. e., after slaughtering, has not been noted.

Source of Infection.

The organism occurs in the blood, muscles, spleen, lungs, and probably in the other organs of the infected animals and of man. Poisoning most commonly arises when the meat has been kept for several days, which usually is the case by the time it is made into some form of sausage. In the meantime the bacilli have proliferated and additional toxin has been produced. In at least one instance a certain number of patients who ate the meat while it was fresh suffered moderate or no intoxication, whereas those who ate it several days later became violently ill. In an epidemic caused by horse meat Drigalski found that "only those persons suffered from intoxication who ate the meat after it had lain for eight days or more."

Growth in the Meat.

The micro-organism is very resistant to heat and the temperature which is attained in ordinary cooking may not be sufficient to kill all the bacteria which are the farthest from the surface. Even in the event that the meat has been thoroughly sterilized, the heat resistant toxin may be present in sufficient quantity to cause the intoxication. Not much is known concerning the distribution of *Bacillus enteritidis*. v. Ermengem suspects that it may be a cause of poisoning by oysters and fish, but this remains undetermined.

Toxin in Meat.

The blood acquires specific agglutinins during the course of infection. Even eight days after the beginning of symptoms agglutination may be obtained in dilutions varying from 1/200 to 1/4000. The agglutinins disappear very rapidly. Working with artificially prepared immune serum, Drigalski determined the existence of coagglutinins for typhoid and paratyphoid bacilli.

Agglutinins.

We should bear in mind the likelihood that meats poisoned with *Bacillus enteritidis*, as well as by paratyphoid bacilli, may be encountered in America as well as in foreign countries.

BACILLUS COLI COMMUNIS.

Bacillus coli communis, *Bacterium coli commune*, or the colon bacillus, is the type of a large group of organisms the members of which show individual differences but possess certain dominant features in common. The typical colon bacillus ferments various sugars, with the production of gas, is a strong acid producer and curdles milk. It is flagellated, has moderate motility and does not stain by Gram's method. One type or another is the normal inhabitant of the intestinal tract of many animals, and although the organisms are widely disseminated in nature their occurrence is related directly or indirectly to the distribution of feces.

Its optimum temperature for growth is 37 C., and above 46 C. it does not proliferate. It is killed at a temperature of from 60 to 61 C. in from five to fifteen minutes; it is not killed by such low temperatures as from 20 to 24 C. It resists absolute desiccation for periods varying from a few days to several months (different observers). Direct sunlight kills 99 per cent. of the germs in two hours (Billings and Peckham), and they are very susceptible to ordinary antiseptics. The normal serums of many animals are bactericidal for the colon bacillus.

Resistance.

Escherich, a noted authority on this organism, lays down the principle that that strain which may be cultivated from the feces of the nursing child should be considered as the typical *Bacterium coli commune*, maintaining that a constant type of organism is found under these conditions. It is said to occur here in relatively pure culture.

Within a very short time after birth the organism is found in the intestines of infants, and its method of entrance has been the subject of much discussion. In view of its wide distribution it is not difficult to conceive of many circumstances which favor its entrance. Having once reached the intestines, it finds there its optimum conditions for growth. The small intestines in man are rather free from colon bacilli and other organisms as well. This, perhaps, is due to some extent to the alkalinity of the medium and to the rather rapid flow of the intestinal contents. The colon bacillus reaches its maximum development in the large intestine, where, in fact, the whole bacterial flora of the intestines is most concentrated.

Distribution in the Intestines.

In view of the fact that the colon bacillus is a normal inhabitant of the intestines, the conception has occurred to many that it may be of distinct value to the economy, either because of the action it has on certain foods (splitting of carbohydrates), or because in some obscure way it influences favorably the assimilation of foods, or in that it antagonizes other bacteria of distinct pathogenic powers which also exist normally in the intestines or reach them through accident. This is not the place to consider these questions in detail, and they are on none too definite a basis. It may be stated, however, that the colon bacillus and another closely related organism, *Bacillus lactis aerogenes*, distinctly antagonize the action of certain proteolytic bacteria which appear to be associated with the putrid decomposition of milk and other proteid-containing foods. Bacteria of the later type exist in the intestines. Unsterilized milk has a natural resistance to putrid decomposition and sterilized milk, which contains the colon bacillus or *Bacillus lactis aerogenes*, has a similar resistance. These two bacteria flourish in the presence of carbohydrates, which they decompose with the liberal formation of acids, and through these acids they "limit intestinal putrefaction and influence (favorably) pathologic processes which are caused or maintained by the existing 'alkaline fermentation'" (Escherich and Pfaundler). That the organisms in question antagonize the action of putrefactive bacteria has been shown in test-tube experiments (Hirschler).

Normal Functions.

Since the time that Emmerich upheld the colon bacillus (or a colon-like microbe) as the cause of Asiatic cholera (1885), opinion as to the pathogenic powers of the organism have undergone many fluctuations. Following Koch's demonstration of the vibrio of cholera as the etiologic factor in cholera, the colon bacillus was, so to say, repressed as a pathologic agent. Later, and especially in France, great significance was again attached to it. The condition still shows a great deal of chaos, although on account of more refined technic and the elimination of other organisms, as the dysentery and paratyphoid bacilli and *Bacillus enteritidis*, from the colon group proper, we are, perhaps, on the way to a more satisfactory understanding of the pathogenicity of this organism. Although certain authors hold at the present time that the colon bacilli which normally inhabit the intestines are devoid of virulence, such a radical position is open to question. Avirulent strains have often been encountered, however.

Pathogenicity.

As harmless as the colon bacillus appears to be when confined in the intact intestines, its virulence for animals, although low, has been demonstrated in many instances. A bouillon culture of the average bacillus which has grown from one to two days, and when freshly cultivated from the stools, causes the death of a 300 to 400 gram guinea-pig in two or three days, when given intraperitoneally in a dose of from 2 to 3 c.c. Subcutaneous inoculations commonly cause

Virulence for Animals.

abscesses and may lead to death. Pathologic processes have not been set up by feeding cultures to animals. Inflammations have been caused in the bladder and in the bile passages by the injection of cultures. It is stated (Escherich) that whether the cultures are introduced into the skin, peritoneum or vessels, the symptoms of severe gastroenteritis are produced, not unlike Asiatic cholera. This fact may have influenced Emmerich in considering the orgainsm as the cause of cholera. The general symptoms are those of an acute febrile intoxication.

The organism is most pathogenic when freshly cultivated, and soon loses its virulence after repeated transplantations. As in the case of some other organisms, virulence may be reestablished by "passage" through suitable animals.

Virulence for Man.

The cultivation of the colon bacillus from the blood and organs of man at autopsy has not the significance which was once attached to it. It has been recognized that the colon bacillus in particular, and less commonly other intestinal organisms, may enter the circulation a short time before death, at a time when resistance is very low, and may obtain the general distribution which is so often encountered at autopsy; this is the so-called "agonal invasion," which may occur without much regard to the primary cause of death. The conditions which favor agonal invasion remain to a large extent obscure. Distinct defects of the intestinal mucosa probably are not essential, although this view has its representatives. In states of low vitality in which resistance to infection is decreased (disappearance of complement!), the organisms find conditions favorable to proliferation when they have once reached the circulation. In spite of the low virulence of the colon bacillus it commonly has a certain amount of toxicity and it may often be of significance even as an agonal infection.

Postmortem invasion of adjacent structures, as the gall bladder and liver through the biliary passages, and of the peritoneum through the intestinal wall, also occurs.

True Infections.

It has been shown that the colon bacillus occasionally causes the following conditions: Suppurative cholecystitis which may extend to the liver, peritonitis, septicemia, meningitis, cystitis, pyelitis and ascending suppurative nephritis, and abscesses in various organs, including suppurative processes in the middle ear. In one or more instances it has been thought that it caused vegetative endocarditis. Probably colon infections of the gall bladder do not occur in the absence of biliary stasis. Ordinarily cases of peritonitis in which the colon bacillus is encountered also show the presence of other pathogenic organisms, as streptococci or staphylococci; this is always the case in perforation peritonitis. Doubtless wrong conclusions have been drawn in many instances from the fact that the colon bacillus readily overgrows many other bacteria in ordinary culture media.

Cystitis.

Escherich attributes great importance to this organism as the cause of cystitis, especially in children, and states that it is probably the most common cause in all cases of cystitis. In 58 of 60 cases of cystitis in children the colon bacillus was found either alone or in mixed cultures. He also considers it the most common cause of pyelitis and ascending suppurative nephritis. An increased agglutinating power of the patient's serum for the organism cultivated from the urine is noted in these cases.

Diarrheas.

Great interest attaches to the colon bacillus in relation to enterocolitis and dysenteric diseases. Escherich speaks of an *enteritis follicularis*, or *colitis contagiosa*, or colicolitis, epidemics of which have been noted at different times. A number of these epidemics occurred before the identification of the dysentery bacillus, and certain of them may have been true dysenteric infections. Nevertheless, dysentery bacilli are not found in all cases of enterocolitis, and the probability that genuine cases of colon enteritis occur can not as yet be neglected entirely.

A specific colon toxin has not been obtained.

Immunization with the colon bacillus causes the formation of bactericidal amboceptors and agglutinins.

Agglutination.

Not all strains of the colon bacillus are identical in their agglutinogenic receptors. A serum which agglutinates one colon strain does not necessarily agglutinate all strains. The reaction, according to Paltauf and others, is largely an individual one. The serum of a patient who is suffering from a colon infection will agglutinate the particular strain causing the disease, but may not affect other strains. Hence, for diagnostic purposes, the test must be performed with the culture which has been obtained from the patient. Pfaundler says in reference to colicolitis that if other colon infections can be excluded, and if the serum of the patient gives the agglutination reaction in a dilution of 1 to 50 with the bacillus which has been cultivated from the stools, colon infection is indicated (Paltauf).

FOURTH OF JULY INJURIES AND TETANUS.

For the third consecutive year THE JOURNAL publishes statistics regarding injuries received during the Fourth of July celebration, with special reference to tetanus resulting from these injuries. The total number of cases this year is 104, surprisingly near to the number of cases in 1904, which was 105. In 1903 there were 415 cases. It is interesting likewise to compare the totals of accidents resulting from blank cartridges in the same years, which are in a like proportion. In 1903 there were 1,672 injuries from blank cartridges; in 1904, 1,005, and this year, 809. Regarding totals of accidents and their causes, we shall have further comment later in this paper.

The figures this year are from the same source as heretofore and treated in the same manner, so that any comparisons between the figures of this and either of the preceding years may be on a presumably like basis. The list of tetanus cases is as follows:

TABLE 1.

	NAME.	AGE.	CAUSE OF WOUND.	SITE OF WOUND.	DURATION IN DAYS.	RESULT
	ALABAMA.					
1.	Lattimer	10	bl. ctg	hand	17	D
	CALIFORNIA.					
1.	Eagle	11	bl. ctg	hand	6	D
2.	Erway	21	bl. ctg	hand	10	D
3.	Spurgeon	11	bl. ctg	chest	7	D
4.	Iridlocotta	6	fireworks		9	D
	COLORADO.					
1.	Smith	16	cannon	leg		
	CONNECTICUT.					
1.	Monitz	13	gunshot	finger	11	D
2.	Beaulien	19	cannon			
3.	Rabinowitz		bl. ctg	hand		
	DELAWARE.					
1.	Eggner	11	bl. ctg	hand	12	D
	ILLINOIS.					
1.	Honny	9	bl. ctg		8	D
2.	Zeck	13	bl. ctg	finger	7	D
3.	Boyer	12	bl. ctg	groin	20	D
4.	Mason	16	fireworks		6	D
5.	Concartino	19	gunshot		7	D
6.	Lyon	22	bl. ctg	hand	9	D
7.	Schreta	28	gunshot		12	D
8	Murray	14	gunshot	hand	9	D
9.	Sumner	boy	bl. ctg	hand		D
10.	Leviston	11	gunshot		8	D
11.	Justice	9	bl. ctg	hand	13	D
12.	Olson	11	bl. ctg	leg	8	D
13.	Kirschner		fireworks	leg	20	D
14.	Stevens	17	bl. ctg		24	D
15.	Mawer		bl. ctg			D
16.	Colby	man.	*giant cr'k	hand amp.	7	D
17.	Drennan	54	giant cr'k	eye, hand	8	D
18.	Campbell	12	bl. ctg	hand		
19.	Zeck	13	fireworks		16	D
20.	Downey	adult	giant cr'k	hand	18	D
	INDIANA.					
1.	Connelly, Lester	8	bl. ctg		11	D
2	Crieger	11	bl. ctg	hand	9	D
3.	Sauer	11	bl. ctg	hand	16	D
	IOWA.					
1.	Nisson	20	bl. ctg	hand	17	D
2.	Iverson	10	bl. ctg		9	D
3.	Wentland	adult	giant cr'k		22	D
	MAINE.					
1.	Hatch	16	bl. ctg	hand	11	D

* Reported by one paper as blood poisoning.

	NAME.	AGE.	CAUSE OF WOUND.	SITE OF WOUND.	DURATION IN DAYS.	RESULT.
	MARYLAND.					
1.	Bowen	12	bl. ctg		10	D
	MASSACHUSSETTS.					
1	Lebida		cannon.	finger		
2.	Roy	boy.	bl ctg	hand	8	D
3.	Challman	10	powder	hand	10	D
4.	Mitchell	12	bl. ctg		7	D
5	Bailey	12	fireworks	hand	12	D
6	Norris	16	bl. ctg	hand	14	D
7.	Morrell		bl. ctg	hand	8	D
	MICHIGAN.					
1.	Bartels	12	bl. ctg	finger	9	D
2.	Tobias	10	bl. ctg	hand		
3	Sneath	11	bl ctg	hand		
4.	Wingett	11	bl. ctg		12	D
5.	VanAntwerp	14	bl. ctg	finger	9	D
6.	Robinson	11	giant cr'k	leg	18	R
7.	Bashore	14	bl. ctg		10	D
8.	Szewitski	12	powder	hand	5	D
9.	Mangus	10	bl ctg	leg	14	D
	MINNESOTA.					
1.	Ensland		giant cr'k		12	D
2.	Kruk	27	giant cr'k	hand	11	D
	MISSOURI.					
1.	Gibeant	8	bl ctg	hand	11	D
2.	Dilley	12	fireworks	leg	11	D
3.	Truesdale	15	bl ctg	hand	7	D
	MONTANA.					
1.	Smith	adult	giant cr'k	hand	25	D
	NEBRASKA.					
1.	McCarville	12	bl. ctg	hand	13	D
2.	Robla	11	bl. ctg	hand		D
3.	Robinson	man	bl ctg	finger	10	D
	NEW JERSEY.					
1.	Taylor	11	bl. ctg	hand	11	D
2.	Johnson		bl ctg	hand		
3.	Jorzak	18	bl ctg	hand		
	NEW YORK.					
1.	Casey	42	giant cr'k	leg	4	D
2.	Kohler	8	bl. ctg	hand	8	D
3.	Crowley	15	bl ctg	hand	10	D
4.	Biegel		giant cr'k		12	D
5.	Mustico	9	bl. ctg	finger	8	D
6.	Flood	9	bl. ctg	hand		
	OHIO.					
1.	Meyer	16	bl. ctg	hand	6	D
2.	Geiger	13	bl ctg	hand		
3.	Palmer	10	giant cr'k	hand	7	D
4.	Tellkamp	12	bl ctg	leg	10	D
5.	Robinson	14	torp	hand		
	OKLAHOMA.					
1.	Cronkett	14	cap	finger	10	D
	PENNSYLVANIA.					
1.	Overpeck	19	bl. ctg	hand	8	D
2.	Yothers	13	cannon			
3.	Sherman		bl. ctg		12	D
4.	Payne		powder		14	D
5.	Lengel	78	fireworks	ear		D
6.	Ternent	15	giant cr'k	hand	14	D
7.	Bochus	14	bl. ctg	leg	8	D
8.	Nail	17	bl. ctg	hand	19	D
9.	Hartman	boy	bl. ctg	hand	24	D
10.	Parlovix		bl. ctg			D
11.	Caloney	14	bl. ctg	hand	22	D
12.	Daugherty	3	giant cr'k	arm, leg	8	D
	UTAH.					
1.	Jacob	40	giant cr'k		20	D
	WISCONSIN.					
1.	Anderson	13	bl. ctg	hand	11	D
2.	Schmick	10	bl. ctg	hand		
3.	Jolly	14	bl. ctg	finger	16	D
4.	Mooney		bl. ctg	hand	6	D
5.	Bussian	10	bl. ctg	leg	8	D
6.	Nolan	11	bl ctg	hand	4	D
7.	Holk	15	giant cr'k	face	12	D
8.	Ennis	8	giant cr'k		12	D
9.	Vanderloo	22	bl. ctg	hand	11	D
10.	Shipped		bl. ctg		16	D
11.	Aohert	boy	fireworks			
12.	Colby		giant cr'k			
13.	Sniegorski	8	bl. ctg		12	D

Tetanus cases occurred in 23 different states, or in 2 more than last year, but in 7 less than in 1903. The eight states having the highest number of cases are Illinois 20, Wisconsin 13, Pennsylvania 12, Michigan 9, Massachusetts 7, New York 6, Ohio 5, and California 4. Six states had 3 cases each, one state had 2, and eight states had 1 each. Wisconsin had more cases this year than in either of the previous years. Connecticut, Illinois, Iowa, Massachusetts and Michigan show an increase over last year. Illinois had 5 more cases than last year. Table 2 shows a comparison of the number of cases in each state for the three years.

TABLE 2.

	1903.	1904.	1905.
Alabama	....	....	1
Arizona	....	....	....
California	2	4	4
Colorado	4	....	1
Connecticut	3	....	3
Delaware	....	....	1
Dist. of Columbia	1	....	....
Florida	....	....	....
Idaho	1	....	....
Illinois	49	15	20
Indian Territory	1	....	....
Indiana	11	6	3
Iowa	14	2	3
Kansas	11	1	....
Kentucky	4	2	....
Maine	2	4	1
Maryland	1	....	1
Massachusetts	16	5	7
Michigan	29	7	9
Minnesota	15	2	2
Missouri	29	1	3
Montana	2	1	1
Nebraska	4	3	3
New Hampshire	2	....	....
New Jersey	8	9	3
New York	36	9	6
North Dakota	....	....	....
Ohio	67	9	5
Oklahoma	....	....	1
Oregon	2	....	....
Pennsylvania	82	17	12
Rhode Island	3	....	....
South Dakota	....	....	....
Tennessee	....	....	....
Texas	....	....	....
Utah	....	1	1
Vermont	3	2	....
Washington	2	1	....
West Virginia	3	....	....
Wisconsin	10	4	13
Wyoming	....	....	....
Total	415	105	104
No states having cases	30	21	23

It appears that most of the restrictions by city ordinances against fireworks during the past few years have been against the toy pistol. This probably accounts for the decrease in the number of cases from this cause the last year and possibly for the enormous decrease from 1903. Table 3 shows a comparison between the causes of tetanus cases this year and the two previous years.

TABLE 3.—CAUSES OF TETANUS CASES.

	Blank cartridge.	Giant cracker.	Cannon.	Firearms.	Powder, etc.
1905	65	17	4	5	13
1904	74	18	5	1	7
1903	363	17	5	3	27

While the number of cases from blank cartridges is decreasing each year, cases from the other causes remain about the same or on the increase.

Besides the lockjaw cases directly due to 4th of July accidents, 32 cases were reported this year due to other injuries, as penetrating wounds from nails, splinters, from crushing injuries in falls or otherwise, compared with 55 such cases last year and 15 in 1903.

DEATHS AND INJURIES ASIDE FROM TETANUS.

In Table 4 will be found a summary of all injuries, including tetanus, as well as of all causes. This is arranged, as heretofore, by states, so that comparisons may be made. Beneath the totals at the bottom of this table we have inserted for comparison the totals for 1903 and 1904. Table 5 is arranged to show a more ready comparison by states of the total accidents and deaths for three years.

Pennsylvania, the birthplace of independence, is this year, as last, far in the lead with 721 casualties, followed by New York with 566 and Illinois with 542. Two years ago Massachusetts led with 637, but last year dropped to eighth place with only 193, and returned this year to fourth place with 467. The 1,007 total increase over last year is fairly well distributed among the states.

All accidents were carefully omitted which were not

received in the discharge or handling of fireworks or other means of noise production on or about the Fourth of July. For instance, some soldiers in the course of their regular duty were killed by the explosion of a cannon while firing the morning salute on the morning of the Fourth. As this might have happened at any time and was in line with their regular duty, it could not well be considered as due to fireworks for Fourth of July celebration.

Besides 87 deaths from tetanus, there were 95 from other accidents, making a total of 182 deaths. There were 4,994 non-fatal injuries, or over a thousand more of others having their faces lacerated or other disfigurements which the hapless celebrants will carry with them to the ends of their lives. And this was "better than former years!"

Of the 95 killed, aside from tetanus, through the use of fireworks, there were 37 persons killed by gunshot wounds, 13 of these being hit by stray bullets from the reckless use of loaded revolvers or rifles on the part of others; 23 persons, mostly young children, were burned to death by fire resulting from fireworks; 10 persons died from fright or shock as a result of the sudden loud noises near them.

TABLE 4.—SUMMARY BY STATES OF JULY FOURTH CASUALTIES.

STATE.	Deaths.			Injuries.						Total Persons Dead or Injured.	Causes of Tetanus Cases.		Causes of All Cases Aside from Tetanus Cases.					
	From Tetanus.	From Other Causes.	Total.	Loss of Sight.	Loss of One Eye	Loss of Legs, Arms or Hands	Loss of Fingers, One or More.	Other Injuries.	Total Non-fatal Injuries.		Blank Cartridge.	All Other Causes.	Blank Cartridge.	Fire Crackers.	Cannon.	Firearms.	Stray Bullet.	Canes and Caps.	Powder and Fireworks.
Alabama	1	....	1	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	3
Arizona	....	....	....	....	....	....	....	4	4	4	....	....	....	1	....	....	....	....	1
Arkansas	....	....	....	....	....	....	....	3	3	3	....	....	2	....	....	....	....	....	....
California	4	3	7	....	6	4	2	123	135	142	3	1	18	37	16	7	5	6	49
Colorado	....	1	1	....	1	2	1	21	25	26	....	1	....	13	2	....	1	....	9
Connecticut	1	4	5	....	1	....	4	122	127	132	1	2	39	32	15	6	....	3	34
Delaware	1	1	2	....	....	1	1	10	12	14	1	....	3	5	....	2	....	....	3
District of Columbia	....	....	....	....	....	....	1	23	24	24	....	....	1	9	1	4	....	....	9
Florida	....	....	....	....	....	....	....	2	2	2	....	....	1	....	1	....	....	....	....
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Idaho	....	....	....	....	1	....	....	2	3	3	....	....	....	3	....	....	....	....	....
Illinois	19	16	35	2	11	9	27	458	507	542	10	10	94	198	64	32	22	18	94
Indian Territory	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Indiana	3	4	7	2	3	4	7	194	210	217	3	....	29	80	27	8	5	3	62
Iowa	3	6	9	2	10	3	33	271	319	328	2	1	23	172	37	8	4	16	65
Kansas	....	2	2	....	1	2	4	47	54	56	....	....	7	22	9	4	....	6	8
Kentucky	....	....	....	....	1	....	....	16	17	17	....	....	....	....	2	1	1	1	13
Louisiana	....	1	1	....	....	....	....	2	2	3	....	....	....	....	....	2	....	....	1
Maine	1	....	1	....	....	1	1	26	28	29	1	....	3	4	2	2	....	....	17
Maryland	1	....	1	....	....	....	1	11	12	13	1	....	....	6	....	....	....	....	6
Massachusetts	6	3	9	....	5	1	12	440	458	467	4	3	98	139	39	20	9	7	148
Michigan	6	3	9	....	9	5	21	244	279	288	7	2	42	107	33	11	1	21	64
Minnesota	2	1	3	....	5	2	4	160	171	174	....	2	25	84	10	5	1	6	41
Mississippi	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Missouri	3	2	5	1	8	3	10	191	213	218	2	1	71	45	15	9	6	4	65
Montana	1	1	2	....	....	....	2	36	38	40	....	1	....	14	1	....	....	1	23
Nebraska	3	1	4	....	2	....	1	36	39	43	3	....	12	14	3	1	1	2	7
Nevada	....	....	....	....	....	....	....	2	2	2	....	....	....	....	....	....	....	....	2
New Hampshire	....	....	....	1	....	....	1	7	9	9	....	....	....	6	1	....	....	....	2
New Jersey	1	....	1	4	5	10	15	315	349	350	3	....	73	110	31	22	9	7	95
New Mexico	....	....	....	....	....	1	1	3	5	5	....	....	....	2	....	1	....	....	2
New York	5	14	19	6	10	14	16	501	547	566	4	2	69	169	44	42	38	8	190
North Carolina	....	....	....	....	....	....	....	1	1	1	....	....	1	....	....	....	....	....	....
North Dakota	....	....	....	....	1	1	2	25	29	29	....	....	....	21	3	....	....	1	4
Ohio	3	9	12	1	5	1	18	292	317	329	3	2	47	111	39	14	10	17	86
Oklahoma	1	1	2	....	1	....	....	4	5	7	....	1	1	4	....	....	....	....	1
Oregon	....	....	....	....	....	....	2	7	9	9	....	....	....	7	....	....	....	....	2
Pennsylvania	11	15	26	3	9	11	16	656	695	721	7	5	54	222	46	38	25	19	305
Rhode Island	....	1	1	....	....	....	1	9	10	11	....	....	1	5	2	....	....	1	2
South Carolina	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Dakota	....	....	....	....	....	....	....	15	15	15	....	....	2	5	....	....	....	1	7
Tennessee	....	1	1	....	....	....	....	4	4	5	....	....	2	1	....	1	....	....	1
Texas	....	....	....	....	....	....	....	4	4	4	....	....	1	....	....	1	....	....	2
Utah	1	1	2	....	....	....	3	20	23	25	....	1	2	11	....	2	....	2	7
Vermont	....	....	....	....	1	1	....	8	10	10	....	....	1	5	1	....	....	2	1
Virginia	....	....	....	....	....	....	....	5	5	5	....	....	1	1	1	....	....	....	2
Washington	....	2	2	2	....	....	....	11	13	15	....	....	2	7	....	2	....	1	3
West Virginia	....	....	....	....	1	....	2	31	34	34	....	....	4	16	2	3	1	1	7
Wisconsin	10	1	11	1	8	4	12	194	219	230	9	4	15	81	27	18	....	17	59
Wyoming	....	1	1	....	1	....	....	6	7	8	....	....	....	6	....	....	....	....	2
1905 totals	87	95	182	25	106	80	221	4562	5994	5176	65	39	744	1775	474	265	139	171	1504
1904 totals	91	92	183	19	61	61	208	3637	3986	4169	74	25	931	1268	508	406	†	‡	1056
1903 totals	406	60	466	10	75	54	174	3670	3983	4449	363	29	1309	1152	397	236	†	‡	731

† Figures for accidents caused by stray bullets included with "gunshot" wounds in 1903 and 1904.
‡ Figures for accidents caused by canes and caps included with "powder and fireworks" in 1903 and 1904.

than the total for last year, which was 3,986, or for 1903, which was 3,983. Therefore, the total of dead and injured was 5,176, as compared with 4,169 for last year, or 4,449 for 1903. Yet for all this enormous number of injuries we find some cities congratulating themselves on the small number of accidents this year! Some of these reports are rather pathetic. After the expression regarding the "comparatively few accidents this year" follows a long list of names of those having eyes put out, fingers or hands torn off, of one young man to save whose life it was necessary to amputate both legs, and A baby was thrown into convulsions and died as the result of a large firecracker explosion near its ear; 7 were killed by a cannon, a number by the bursting of these from an overcharge of powder; 4 were killed by giant crackers, 4 by powder explosions, 3 by misdirected sky rockets, 2 by falls in efforts to get away from firecrackers, 2 in runaways due to firecrackers being thrown beneath the horses, 2 by dynamite and 1 by the explosion of a railroad torpedo.

The non-fatal accidents were apparently more severe this year than last, 6 more were made totally blind, 45

more lost one eye, 19 more lost a leg, arm or hand, and 13 more lost one or more fingers. The most prolific source of severe accidents, causing blindness, loss of hand, arm or other lacerated wounds was the giant cracker. Almost invariably the injury resulted from the picking up of the cracker or retaining it in the hand on the supposition that "it had gone." From a number of sources comes the observation that, while the spark continued to burn the central pith, *the outer part of the fuse ceased to burn.* Thus the spark had disappeared, giving the impression that it had gone out until an explosion resulting in the tearing or loss of an eye, finger, hand or arm, gave ample proof to the contrary. This is further shown by the experience of one lad who picked up the cracker and put it under water to make sure the spark was out, but still it exploded, tearing his hand badly.

Following the giant cracker, the toy cannon still nearly holds its old place as a means of destruction. Stray

TABLE 5.—TOTAL DEATHS AND ACCIDENTS BY STATES DURING THREE YEARS.

	1903.	1904.	1905.
Alabama	2	7	1
Arizona	1	....	4
Arkansas	....	....	3
California	100	138	142
Colorado	39	44	26
Connecticut	162	133	132
Delaware	1	5	14
Dist. of Columbia	2	10	24
Florida	1	2	2
Georgia	....	....	....
Idaho	4	4	3
Illinois	366	423	542
Indian Territory	1	....	....
Indiana	160	211	217
Iowa	168	137	328
Kansas	63	88	56
Kentucky	30	72	17
Louisiana	....	2	3
Maine	31	32	29
Maryland	21	22	13
Massachusetts	637	193	467
Michigan	144	157	288
Minnesota	157	102	174
Mississippi	....	....	....
Missouri	147	84	218
Montana	5	17	40
Nebraska	46	63	43
New Hampshire	37	23	9
New Jersey	228	204	350
New Mexico	....	4	5
New York	522	549	566
Nevada	....	1	2
North Carolina	....	....	1
North Dakota	10	8	29
Ohio	443	327	329
Oklahoma	....	3	7
Oregon	16	13	9
Pennsylvania	533	744	721
Rhode Island	64	30	11
South Carolina	....	....	....
South Dakota	4	10	15
Tennessee	4	1	5
Texas	2	2	4
Utah	23	22	25
Vermont	45	14	10
Virginia	....	11	5
Washington	21	25	15
West Virginia	19	16	34
Wisconsin	190	215	230
Wyoming	1	2	8
Total	4,449	4,169	5,176

bullets are entered in a column by themselves where heretofore they were entered in the column with "gunshot" wounds. This will show how many people are injured through the careless use of firearms on the part of others, and show in what states laws against firearms are less strictly enforced. As before stated, 13 people were killed outright through this recklessness, and 126 others more or less seriously injured.

We have added a column for the canes and caps. Even these canes, which at first were heralded as a safe means of noise making, are not as harmless as at first supposed. The noise element is certainly a success, but the exploding cap often causes penetrating wounds of the ankles or legs—usually the most unprotected part of those who use them, the boys with knee pants. Then, overcharging the cane caused it to explode in many instances, the particles of iron doing considerable damage. One case of tetanus this year resulted from such an injury.

As to preventative measures, we learn from many sources that great pains were taken this year to be prepared to give antitoxin in all injuries of a penetrating nature. Health departments in some of our large cities distributed a supply of antitoxin to the various hospitals and dispensaries that it might be ready if needed. Local medical organizations met before the Fourth, discussed the treatment of tetanus, and passed resolutions in favor of legislation regulating or restricting the use of fireworks. Cities passed ordinances, some only against the toy pistol, others prohibiting the sale of firecrackers above a certain size. Others prohibited the use of fireworks on any other day than the Fourth, while one city, Baltimore, placed the ban on the use of fireworks of all descriptions. The results in Baltimore are certainly gratifying, there being only 6 accidents reported from that city, and these of a minor nature.

This year, however, many cities did not stop with the passing of ordinances; arrests for their violation were numerous, and therein is a hopeful sign. Only a few years ago an arrest for making a noise on the anniversary of the nation's independence would have been looked on as against the spirit of patriotism and declared an outrage. Nothing better shows the change in public sentiment than the fact that this year a great many arrests were made and by public approval. Undoubtedly the publication of the facts, showing the enormous cost in life and limb of this manner of celebrating the Fourth of July, has helped to bring about this change in sentiment. The vigorous action of medical organizations throughout the land has added impetus, and the press has taken the matter up to a remarkable degree and has made good use of our published data on the subject.

The work should go on, however, until properly enforced laws shall put an end to the annual slaughter and maiming of so many of our children and young people. It is certainly high time there was an end to it. To place a sharp-pointed knife or a bottle of poison in the hands of a babe would certainly be as sane an act as to place in the hands of children or others inexperienced in the dangers and handling of them, such destructive implements as blank cartridge pistols, cannon, powder and giant crackers have proved themselves to be.

We urge it on the members of the medical profession, and on the press of our country, to continue with us in this crusade for a safe and sane celebration of our nation's birthday. The work of the past few years has had its results. May the movement have accelerated speed!

Clinical Reports

SUBCUTANEOUS EMPHYSEMA IN A CASE OF BRONCHOPNEUMONIA.

FRED S. SPEARMAN, M.D., C.M.

WHITING, IOWA.

Instances in which this condition is as widespread over the body as in the following case are not of frequent occurrence; another interesting point in this case was the rapid initial development of the emphysema. Nothnagel regards subcutaneous emphysema as a very grave complication in bronchopneumonia.

Patient.—J. B., aged 16 months, with the exception of a slight cold last winter, had always been healthy.

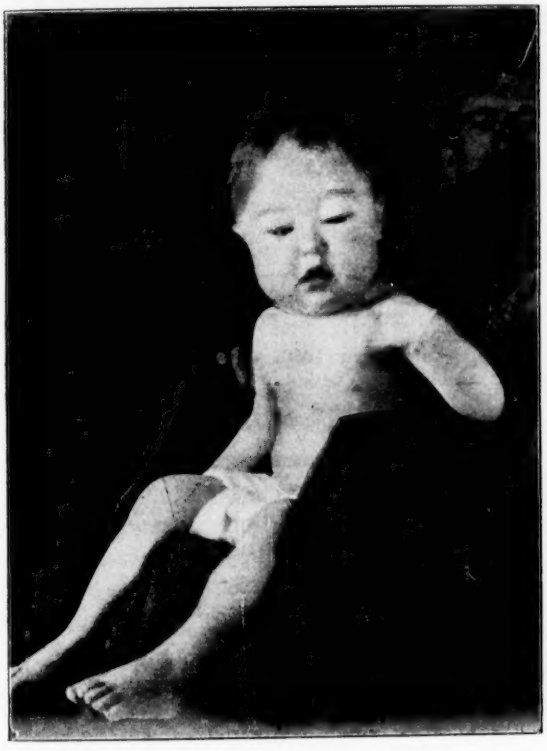
Family History—Both parents are living and in good health. An older brother and sister were recovering from the whooping cough. Father's mother died of phthisis.

Present Illness.—I first saw the patient on June 4. The parents informed me that she had been suffering from whooping cough for about five weeks, but a day or two before I was called she developed a high fever with vomiting, and the cough altered in character.

Examination.—This showed fine crepitant râles, general throughout both lungs, respirations about 70 to the minute, pulse 160, temperature 102.6 in the axilla. Cough was hard and tight, expiration grunting, and nervous symptoms marked, such as clutching at the bed clothes and restlessness. The face was of a dusky hue; in short, all the symptoms of a severe bronchopneumonia were present.

Course of the Disease.—For the next three days there was little change in the general condition. The râles, however, became more liquid as secretion developed. There was considerable meteorism, and the rectum would become partially prolapsed when the child coughed.

On the afternoon of June 8 a slight swelling appeared on the



left side of the neck, low down. That same evening, during a severe coughing spell, the swelling suddenly increased in size and spread in a few moments' time up the side of the face and on to the left temple and upper eye lid, completely closing the eye. By the following morning the upper part of the chest before and behind was involved, and the day after the entire scalp and right side of the face so that the right eye was also closed. During the ensuing three days the tumefaction extended over the remaining portion of the chest, as far down posteriorly as the sacrum, and down both arms.

Over the portions where the swelling was most marked the skin was tense and shiny, the swelling was elastic and non-resistant to pressure, crackled under the finger and was tender. The crackling resembled the sound made by squeezing a rag saturated with soap suds. I diagnosed the condition as subcutaneous emphysema resulting from a ruptured bronchus.

Whether it was a mere coincidence or not, with the appearance of the emphysema the general condition greatly improved, the nervous symptoms disappeared so that the child rested easily, grunting expiration soon nearly ceased, expectoration became profuse and easy, and the face showed a much better color. Pulse and temperature were also lowered, the latter dropping by lysis until, by June 17, it had reached normal. It occurred to me that possibly the escape of the air into the tissues had a favorable effect by relieving intrapulmonary pressure. By June 27 the emphysema had entirely disappeared, being last noticed on top of the head, and when I last saw the little girl, July 4, she had apparently recovered her usual health.

Treatment.—This was along the lines commonly employed in bronchopneumonia. The emunctories were kept active by means of frequent sponging with tepid water, calomel and enemata for the bowels, and plenty of water to drink. Diet consisted of milk and light broths. The chest was kept protected by a cotton batting jacket. A saline mixture containing iodid and citrate of potash with aromatic spirits of ammonia was administered to promote bronchial secretion and keep it free. The child vomited very easily, the attacks of coughing frequently producing emesis, so that it was rarely necessary to employ emetic measures in order to get rid of mucus.

The photograph was taken after the emphysema had commenced to subside, but shows clearly the puffy appearance of the eyelids, and also in part the swelling over the upper chest in front and behind.

CARBOLIC ACID BURN.

EFFECTUAL, ALTHOUGH LATE, USE OF ALCOHOL.

T. J. SWISHER, M.D.

RAWLINS, WYO.

A young lady employed in a drug store started home from work in the evening, taking with her a number of small parcels to deliver to patrons of the store who lived in her neighborhood. Among these parcels was an ounce bottle filled with 95 per cent. carbolic acid. In some way the bottle was broken, pouring the contents over both hands. As it was dark, she did not at first know what the bottle had contained, and only after the hands began to burn did she take the trouble to wipe off the excess of acid with her handkerchief. After reaching home, she applied a dressing of vaselin and it was not until over an hour after the burn occurred that I saw her. At this time the white eschar covered the entire palmar surfaces of both hands as well as the palmar and interdigital surfaces of all the fingers. Sensation over this surface was entirely absent and the fingers could not be voluntarily flexed. The hands were at once cleansed of the vaselin and put into an alcohol bath, with constant rubbing. After ten minutes the color began to return, a tingling sensation developed and the fingers could be voluntarily flexed. The alcohol bath was continued for twenty minutes and all evidence of the burn had then disappeared except a slight tingling and stiffness of the fingers which persisted for several hours, but which almost entirely disappeared by the following day. Aside from a little cracking of the skin over the finger tips and an unpleasant dryness which persisted for a week, the recovery was complete and immediate.

To me the interesting feature of the case was the length of the interval between the receipt of the burn and the application of the alcohol.

Believing this to be a topic worthy of discussion, I would like to hear from others with special reference to the length of time that may elapse before alcohol loses its power as a local antidote for this acid.

Diazo Reaction in Tropical Diseases.—A. Austregesilo of Rio Janeiro has been studying this subject since 1900. He found the diazo reaction almost constantly present in bubonic plague. Certain drugs modify the reaction, and as the disease progresses to a fatal termination the reaction generally fails. Antiplague serum does not affect it. In yellow fever and in malaria the tests were invariably negative. In beri-beri the reaction was always negative, as well as in leprosy, in scurvy and ankylostomiasis. In typhoid fever and in tuberculosis his findings were the same as those reported by others elsewhere. In smallpox the reaction was always present. His report is published in the *Revista Med.-Cir. do Brazil*, xiii, No. 3.

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FOURTH OF JULY CASUALTIES.

In this issue appears an annual summary of the accidents due to the idiotic methods of celebrating our national anniversary. The list, which no one can claim to be absolutely complete, is yet sufficiently appalling. There must be hundreds of minor injuries and many of a more severe character occurring on Fourth of July that never receive any public notice, and even deaths directly or indirectly due to such accidents undoubtedly escape publication or are miscredited to other causes. If we could have the full total of what we owe of human life and human suffering to this cause fully revealed, the facts would be still more formidable.

Nevertheless, the figures this year are full of encouragement. While the total of non-fatal injuries is greater than those of two years preceding, the total of deaths is still on the decrease, especially as compared with the figures of 1903. The difference is still more striking when we consider only those caused by tetanus, the most terrible death-causing factor. The toy pistol which has been so important a factor in the tetanus mortality in past years seems to be in the process of legal suppression, and what has been done in this particular case is possible with other of the important causes, a fact which is a very encouraging indication for the future. We can credit also to the direct use of antitoxin as a prophylactic, especially in some of our larger cities like St. Louis, a certain proportion of the prevention of Fourth of July tetanus. The use of this antitoxin is likely to increase and we may be hopeful of still better results in the future. The giant cracker is also a less fruitful cause of lockjaw, a fact probably due in part to the laws against its use. While the total deaths from tetanus, as well as from all causes, is not so markedly less than that of 1904, though very strikingly so as compared with 1903, we do not believe that this indicates that we have reached the normal limit of the result of effort for its decrease. The only satisfactory outcome will be reached when Fourth of July accidents are abolished as a cause of death or serious injury.

When we take the total of all injuries into account, the figures are, at first sight, less encouraging, as they exceed those of both of the previous years. This may be due, in part, to better reporting of minor injuries, owing to the interest that has been aroused of late years in the subject, and we think this is likely to be the fact. If so, it is an encouraging symptom rather than otherwise. One thing is certain, it is our duty as a profession to keep up the agitation. The public is not yet half educated as to the importance of the matter. If it were, our municipal and other authorities would be less tardy in their promulgation of proper regulations and less lax in their enforcement—two causes which are responsible for a large part, if not nearly all, of the evil as it exists. If we do our full duty, the time will come, and we believe is not so far distant, when the records of our national holiday will not be like those of a little war.

THE FUSO-SPIRILLAR SYMBIOSIS.

Recent medical literature contains numerous reports of the presence of fusiform bacilli commonly associated with long spirilla on various inflammatory and necrotic processes. In 1893, Rauchfus observed this symbiosis in ulceromembranous angina. In 1896, Vincent, who has made many reports of these organisms, described their presence in hospital gangrene and also in a form of ulcerative angina, since then often spoken of as Vincent's angina. Bernheim noted the presence of the same bacteria in stomatitis. Since then numerous corroborative observations have appeared from various parts of the world, thus indicating that these organisms are distributed widely. Indeed, the fusiform bacillus appears to be a normal inhabitant of the buccal cavity, and it is assumed by Vincent and others that it assumes a pathogenic rôle under special conditions only, more particularly lowered general vitality from all causes and other microbic lesions. Spirilla have been found in healthy mouths also and on normal tonsils, and they are regarded by many as the same organism as Miller's *Spirochæta denticola*. The first list of the different lesions in which these organisms have been demonstrated is constantly growing. Sometimes the fusiform bacillus only is present, but equally as often, if not oftener, both the microbes are present; hence, the term fuso-spirillar symbiosis, which is used by Vincent in a recent article on the subject.[1]

In addition to angina and stomatitis, frequently of an ulcero-membranous character, and noma, the organisms under consideration have been found in fetid oral abscesses, in hospital gangrene, in appendicitis (Vincent observed them in 11 of 19 cases), in gangrenous ulcers of the penis, bronchiectasis, periostitis and fetid abscess of the leg, and in cerebral abscess. It is important to bear in mind that other organisms, especially pyogenic cocci, are always present also. Although the interrelations of these various bacterial forms have not been worked out as yet, many of the lesions mentioned, particularly those associated with necrosis, have such manifest peculiarities that it does not seem likely that the fuso-spirillar symbiosis is wholly devoid of pathogenic significance. Thus, in the microscopic sections of the tissues involved, filamentous organisms are found at the line of advancing necrosis in large numbers. Experimentally the infection of materials from ulceromem-

1. Ann. de Dermat., 1905, vi, 5. Abstracted in THE JOURNAL, July 29, 1905, p. 359.

branous angina, etc., is followed by localized gangrene and abscesses, but here it is manifestly impossible to determine the exact part played by the various bacteria present. This question can be settled only by continued work with pure cultures. Ellermann, as well as Weaver and Tunnicliff,[2] have obtained small abscesses with pure cultures of the bacillus. So far, it has not been possible to isolate the spirillum in pure cultures, although Weaver and Tunnicliff obtained evidences of the proliferation in mixed cultures with the fusiform bacillus and other bacteria. The fusiform bacillus, however, can be isolated in pure culture. Veillon and Zuber, in 1898, were the first to grow a fusiform bacillus which they found in a case of appendicitis. In 1904, Ellermann grew it from ulceromenbranous angina and gangrenous stomatitis, and more recently Weaver and Tunnicliff obtained pure cultures from angina, stomatitis and diphtheria. The bacillus in all cases was an obligate anaërobe that grew at the body temperature only. Further study may show that what is here spoken of as a "fusiform bacillus" in reality represents several varieties, although the descriptions of Ellermann and of Weaver and Tunnicliff appear to tally quite closely.

It is important that the lesions, especially of the mouth and throat, in which the fuso-spirillar symbiosis occurs, should be recognized and studied carefully by clinicians in order that, if possible, a more perfect differentiation may be secured and clinical relations of the processes better understood. In order to recognize the lesions definitely, it is necessary to study carefully cover-slip preparations and to make anaërobic cultures. The usual method followed in the bacteriologic examination of the throat in suspected diphtheria does not suffice, and cases of membranous angina in which the diphtheria bacillus is absent merit particular attention. Deposits about the necks of the teeth, often associated with bleeding gums, in children, especially in institutions, also require special attention. On the whole, it is clear that the time is now at hand when progress in the knowledge of many lesions of the mouth and throat and of fetid and gangrenous processes elsewhere requires the use of anaërobic cultural methods, as well as the aërobic hitherto so largely employed alone.

THE ULTRAMICROSCOPIC, FILTERABLE VIRUS OF HOG CHOLERA.

Hog cholera is a very destructive disease and consequently of great economic importance. It is proving to be an important disease from the purely scientific point, as well because of recent significant discoveries in regard to its etiology. It is on this latter account that a gist of certain recent investigations, particularly by the Bureau of Animal Industry at Washington,[1] under the direction of D. E. Salmon, is presented.

When the hog cholera bacillus (*B. choleræ suis*) was discovered, twenty years ago, it was believed that the etiology of this disease was solved. Facts were continually encountered, however, that did not harmonize with the generally accepted view that the disease is caused by the bacillus. A form of acute hog cholera in southwestern Iowa, in particular, presented high contagiousness, the blood of infected animals being virulent on subcutaneous injection into healthy, non-immune animals, and on recovery a definite immunity—facts that are not observed in experimental infections with the hog cholera bacillus which, it must be borne in mind, is pathogenic to hogs and other animals on experimental inoculation, as well as very frequently present in animals sick with spontaneous hog cholera. De Schweinitz and Dorset found that the actual cause of this form of hog cholera passed through the finest porcelain filters, and that it consequently belongs in the class of so-called filterable or ultramicroscopic viruses, the number of which appears to be increasing slowly. These observations have been confirmed and enlarged by Boxmeyer[2] of Detroit and by Dorset, Bolton, and McBryde.[1] The latter investigators ascribe the new departure of the study of hog cholera to the skepticism felt by the late De Schwenitz as to its generally accepted bacillary origin.

The mysterious virus thus demonstrated is known as yet only by the effects it causes on injection into susceptible hogs, because all efforts have failed to reveal by staining or culture any visible microbe in the virulent filtrates. This virus is not a toxin, because the disease caused by filtered blood serum is transmissible through succeeding animals, a fact that shows that the causative agent possesses the power to multiply. In this respect the filterable virus of hog cholera resembles the virus of foot-and-mouth disease, as well as other diseases of this peculiar group, the only representative of which that occurs in the human being, so far as is now known, being yellow fever.

While the filterable virus must be regarded as the prime cause of the disease studied, the part played by the hog cholera bacillus can not be neglected. In the first place the Washington investigators are not willing to deny that the bacillus, under certain circumstances, may cause an independent disease; on the other hand, however, it seems quite certain that the filterable virus so reduces the natural resistance of the hog that the hog cholera bacillus is able to invade the infected animals and thus probably materially influence the result. Whether the bacillus is a normal inhabitant of hogs is not established definitely, but certain facts point in that direction. The actual demonstration that such is the case would materially encourage the view that the bacillus is a secondary invader. On account of the great probability that the relations between the ultramicroscopic virus of hog cholera and the bacillus of hog

2. Journal of Infectious Diseases, 1904, ii, 446. The literature is given fully in this article.

1. De Schweinitz and Dorset: Bureau of Animal Industry, Circular 41, 1903. Dorset, Bolton, McBryde: Bureau of Animal Industry, 1905, Bulletin 72.

2. Jour. of Infect. Dis., 1905, ii, p. 359.

cholera are those of primary and secondary infecting agents, there is furnished an interesting analogy of what undoubtedly is the case in certain human diseases, especially severe forms of scarlet fever and smallpox, namely, that the primary cause, the actual contagious element, in the case of smallpox especially being capable of wide aerial dissemination, so lowers the general resistance that the otherwise harmless streptococci in the throat are able to invade the tissues and lead to the general streptococcus infection so commonly the case in fatal forms of these diseases. It may be permitted, too, to indulge in the speculation that similar complex conditions as in hog cholera may exist in other human diseases, such as whooping cough, for example, as well perhaps as in others, the etiology of which is now regarded as established.

The demonstration that filterable virus is the essential cause of outbreaks of so-called hog cholera naturally leads at once to new attempts at more effective therapy than heretofore available. Experiments with promising results have been made already by Boxmeyer and McClintock,[3] and the outlook seems favorable for ultimate success.

REMOVAL OF OVARIES FOR CARCINOMA OF THE BREAST.

The relations which exist between the breasts and the internal sexual organs, the uterus and ovaries, while apparent to every observant practitioner, so far as their *modus operandi* is concerned, are as obscure as ever. Aside from the gross changes in the breasts incident to childbearing, more subtle ones are present in many women at each menstrual period. The idea that such a physiologic condition might have a bearing on pathologic processes, and particularly on new growths in the breast, was first, we believe, suggested by the English surgeon, Beatson. Reasoning from analogy that if an ovarian injury in a cow would cause suppression of the milk, ovariotomy in a woman might also affect the mammary glands, he suggested castration in inoperable cases of mammary carcinoma. While the logic of Beatson's reasoning may not appeal to every one, his belief led him to carry into effect the natural deduction to be drawn from it, viz., removal of the ovaries in cases of hopeless mammary carcinoma. Some of the results obtained by Beatson and other surgeons in Great Britain have certainly been striking. While absolute cures have rarely been effected, the operation seems to have produced striking amelioration in a considerable number of cases.

Michels has called attention to the fact[1] that this work has been almost overlooked outside of the British Isles. He cites some remarkable cases to show the marked palliative effect which the operation may have. In at least two cases, quite large areas of carcinomatous infiltration of the breast or chest wall disappeared and had not returned in one case five and in the other eight years after the ovariotomy. Results like these were, however, exceptional, in most instances there was both local and general improvement, but in the long run the growth returned. The local improvement usually took the form of a decrease in pain, and accompanying this in a fair percentage of the cases a reduction in size of the tumor took place. In some instances, ulcerated areas took on a healthy appearance and completely healed up.

There is some dispute as to the indications for this operation. Many British surgeons advise operating even after the menopause, or at least for a year or two after it. Michels is opposed to this, and thinks that this operation should be restricted to women between 40 and 47 years of age. In young women, he thinks the operation is advisable on account of the well-known virulence of carcinoma in them; after the menopause the operation is uncalled for, as Nature has practically done the same thing in a different way. If possible, it is advisable to remove the recurrence of the carcinoma at the same time that the ovariotomy is done.

It is fair to speculate on the way in which the removal of the ovaries influences mammary new growths, and several interesting points arise. If the effect is due to the suppression of an internal ovarian secretion which was stimulating the mammary neoplasm, we must assume that the tumor cells had inherited in a marked degree the possibility of being stimulated, notwithstanding the fact that they are far from being normal breast cells. One would naturally, we think, tend to compare the process described with the shrinkage of myomata, which often follows the menopause. It is well to bear in mind that, at the change of life, the breasts, as well as the other sexual organs, undergo atrophic changes. May it not be that the oöphorectomy simply brings on an artificial menopause and leads in this way to atrophy of the tumor? Here, again, we would have to assume that the tumor cells had inherited the characteristics of their parents, the normal breast cells. There is really nothing very far fetched in this assumption, however, for we know of tumor cells which are able to secrete substances like normal cells. Certain adenomata of the liver, for example, secrete bile. Like everything connected with the question of internal secretions, the subject is a fascinating one, but, like many subjects of a pathologic nature, it brings into the glare of the limelight our weaknesses in physiology. There are still many things to be learned regarding the connection between the breasts and the internal sexual organs.

THE RELATIONSHIP BETWEEN GENERAL PARALYSIS AND TABES DORSALIS.

The similarity which exists between general paralysis of the insane and tabes dorsalis has been noted and commented on since shortly after Westphal accurately described the latter disease. The concurrence of the two diseases is relatively so common, the relation of

3. Jour. of Infect. Dis., 1905, p. 368.

1. Münch. med. Wochft., vol. lii, No. 24, Ab. in Journal, p. 663.

both conditions to syphilis is so frequent, and the pathology of the two diseases so similar that one is tempted to assume that they represent different phases of the same fundamental condition. It is the French school of physicians who have most ardently supported the view that unity between the two diseases exists, though some German observers, notably Schaffer, strongly support them. There are certainly many points in favor of such a view. According to Nageotte, two-thirds of the cases of general paralysis are accompanied by tabes; an individual may start with the latter disease, then mental symptoms may set in and the picture change to that of general paralysis; the brains of tabetics may show the anatomic changes of general paralysis; tabes may be masked by general paralysis. All these facts emphasize the intimate relationship which exists between the two diseases, and while many hold that the two conditions are separate, those who have had an opportunity to study both neurologic and psychiatric cases seem inclined to favor such a unity.

The question has been restudied recently by Cotton, who has had the advantage of being able to select from a large number of patients some twelve of which could be carefully followed from the beginning to the end of their sickness. The cases which were studied were those which would be classed by some authors as taboparalysis. This term includes any case which presents symptoms of a combination of the two diseases, and, of course, includes three possible groups of cases, i. e., those in which the tabes preceded the paralysis, those in which the opposite condition occurred, and those in which the two diseases progressed side by side. All varieties of cases were studied by Cotton and most careful records were kept of the disturbances in sensation, the pupillary reaction, the various crises, bladder and rectal symptoms, and the condition of the deep reflexes. The result of the investigations lead Cotton to believe that the two diseases present many analogies in their etiology, symptomatology, and course, and that they occur so frequently together that it must be more than a mere coincidence. The clinical symptoms of the two diseases when combined is the same as when they exist apart, though there are differences in degree which depend on the predominant anatomic localization of the pathologic process. The absolute identity of the two diseases can not, of course, be settled until more is known of their pathogenesis.

This study of Cotton[1] does more than to draw attention to the similarity between two very common diseases. Reading between the lines, one gathers the impression that much of the disagreement which has existed and which still exists on this and kindred subjects is due, partly at least, to the separation of neurology from psychiatry. This, no doubt, produces experts in both of these subjects, but it narrows their field of vision. The subjects are so closely allied, and run so insensibly the one into the other that they should never have been divorced, and only were divorced by necessity. The stigma attaching to the insane has now been largely removed, and we hope that in the near future there will be in America, as there are now in Europe, more psychiatric clinics in which acute cases of insanity, especially, are seen and studied by the same man who sees and studies neurologic cases.

1. Am. Jour. of Insanity, LXI, No. 4.

THE COUNTY SOCIETY AND THE ORGANIZATION MOVEMENT.

Since the reorganization plan was adopted in 1901—only four years ago—remarkable progress has been made in unifying the medical profession in the United States. The influence of the new spirit permeating the profession is being felt not only in the reorganized states, but even in the two or three states which have not adopted the new plan. Any one who will compare the conditions of to-day, in any part of the country, with conditions of five years ago will realize that a remarkable change for the better has taken place. "Unity, peace and concord," as Osler put it, as well as a spirit of scientific progress, are distinguishing features of the new era.

The recognition of the importance of the county society as a unit is the basic principle on which the work of organization has been and is being conducted. The most important unit in the scheme of organization is the county society; then come the state association, and the American Medical Association. The last is the least important of the three; the first—the county society—the most important. Every effort that has been made by the American Medical Association in developing organization has been made with the above principle in view—the importance of the county or local society.

Now the machinery all over the country is practically complete, and results must be looked for. These are many, but the most important is that of making the county society something more than a name—something more than a piece of machinery lying idle, rusting: it must be made a living force to dignify medicine as a profession, to increase public respect for, and to elevate the material, moral and intellectual status of, that profession. How can this be accomplished; how can the county society be made a power for good to those who belong to it, and to the community? In many and various ways. The first thing to be recognized, however, is that the average county society, if left to itself, will become dormant. There are many exceptions, but this is the rule. Another thing must also be appreciated: if a society can be made a living, active force for good in one community, a similar society can be kept up in another community where similar conditions exist.

It was the recognition of these facts which prompted the House of Delegates and the Board of Trustees to ask Dr. McCormack to continue his work for another year. As Chairman of the Committee on Organization, he has been devoting a large part of his time in the recent past to organization work, although no small part of his efforts was exerted in aiding the adoption of the

uniform plan by the various constituent associations. Hereafter practically all of his efforts will be in the line of building up county societies. His experience has taught him what can be accomplished and how. He has seen the society in one county doing magnificent work, while in the same state, with exactly the same conditions, the society in another county was practically dead; and he has seen why, has shown the members of the dormant society why, with the result that it too has become a living force.

In other words, as he has gone from county to county and from state to state, he has acquired an experience with the methods and conditions that can, with great benefit, be imparted to physicians of other communities. Methods of regulating and upholding fees, and of securing the indispensable post-graduate work in scientific medicine, are thus compared and classified and made available for use everywhere. He has learned from observation and from experience what has been done in some communities in stimulating the organization of the profession; what methods have been adopted for dealing with quackery and with the nostrum evil; what has been done to bring about better relations between the physician and the pharmacist, and, in fine, what has proved to be the most effective methods of dealing with all the business and scientific sides of medicine. Thus Dr. McCormack is working, not as the agent of THE JOURNAL, not to build up the American Medical Association, but to benefit the medical profession of the United States, individually and collectively.

But if the whole country is to be covered, individual counties can not be visited, and should not be except for special reasons. The societies of a councilor district should unite in a district meeting so that mutual benefit may accrue to many and not to one society alone. The councilor should take the initiative, but the officers of a county society who desire Dr. McCormack to come into their community should write to their councilor to invite him. It must be remembered that he will not go into any state or into any district of a state unless the profession of that state or district desires that he should do so. All expenses connected with this work are met by the American Medical Association.

A MISERABLE OUTRAGE.

The depths of venality to which the nostrum makers descend in order to gather in a few more dollars are beyond the belief of those possessing normal human sympathy. One of the worst recent instances of this sort of inhumanity is now to be found in some newspapers of the Southern states. Inserted as news, not as an advertisement (*vide*, for example, the Shreveport, La., *Times* of August 16, 1905) appears what is called "an interview with Dr. Hartman concerning the yellow plague." Dr. Hartman needs no introduction, being widely known to physicians as that citizen of Columbus, Ohio, who has amassed a colossal fortune by selling to a gullible public as a "medicine," under the name of peruna, low-grade whisky flavored with cheap bitters. Aided by two or three avaricious renegade physicians, he has enmeshed in his fraud thousands of clergymen, lawyers, politicians, etc., and, if what is reported is true, has undoubtedly created an appetite for intoxicants in unsuspecting men and women and in innocent children. In the present instance, the fraud on humanity is at least equal in perfidy to that of the traitor who sells out his country. A summary of this interview is being spread broadcast over a portion of the United States for the benefit of yellow fever sufferers. "In all such cases it is advisable for the person to take peruna." "Begin taking peruna at once in teaspoonful doses so as to harden and heal the mucous membrane against the possible invasion of the yellow fever poison."(!) "Peruna should be used during the whole course of the epidemic." "I feel sure that any person following this advice is in no danger of taking yellow fever." What could be worse? Shall such things be permitted to continue? Can nothing be done to protect a fear-stricken people from such damnable outrages on humanity? And what about newspapers that will join in a conspiracy of this kind to defraud their readers for a few paltry dollars?

YELLOW FEVER.

In New Orleans the epidemic is held in check, the rate of increase not rising, while for the week there is a slight falling off in the number of new cases. Unfortunately, the pest spreads outside the city, and in some places the situation is grave. As the disease spreads it is demonstrating the failure of the shotgun quarantines. With dramatic unconcern the disease has penetrated some of the quarantines that have been reported to be "airtight." In our last week's issue we were glad to publish a letter from a correspondent at Natchez, Miss., who maintained that our strictures against the barbarity and futility of the shotgun quarantine were unwarranted. Writing under date of August 15, our correspondent said: "We know that non-intercourse with infected areas will prevent the introduction of the disease into healthy towns, and propose to follow up the plan that has proved safe in other times. . . . But this city is certainly closed to the world for the present." Yet, twelve days later, Natchez admitted to the world that it had nine cases of genuine yellow fever, and three additional suspicious cases. Nothing could more clearly illustrate the great weakness of the non-intercourse quarantine, leaving out of account its brutality of administration in so many places. It lulls the people into a false sense of security, so that the really necessary prophylactic measures either are not taken at all or are executed in a half-hearted way that renders them worse than useless. With all its rigors and entailed human suffering, the shotgun quarantine always fails of its object to arrest every incomer. There is ever a loophole—a careless or avaricious or potatious guard, or a byway that escapes watch. The traveler of the better class, going openly, can not miss detention or deportation, but the criminal and the tramp, and at times the local celebrity of powerful connections, can always find an open door. Town after town in the in-

fected area is demonstrating these truths. It is to be hoped that these widely-known and manifold failures of the rigid quarantine as the sole means of defense against an epidemic will bring about the next most useful lesson to be taught by the present calamity. The money and energy spent on irrational quarantines, with the necessary contribution of still larger sums, if devoted to general and permanent sanitation, the destruction of mosquitoes, the oiling and draining of swamps, marshes and ponds, the close screening of houses, cisterns and beds, and the proper, humane, screened isolation of every suspicious case of illness, would accomplish the good that is desired; and there are no other known means of arriving at this end. It is impossible to believe that the present lessons will be forgotten in the future.

SLEEP-DRUNKENNESS.

Consciousness or the waking state is the condition in which active communication with the external world exists through the intermediation of the senses. It may undergo various modifications, some of a normal character, as in sleep, others of a morbid character, such as coma. During sleep, there is reason to believe, certain subconscious processes, partly of perception, partly of ideation, continue, and of which there is at times recollection and at other times none. This statement is exemplified in connection with dreams. In the derangements of consciousness symptomatic of morbid states, such as that which occurs, for example, in the course of epilepsy or of uremia, there is, as a rule, no memory of events that have transpired during this time. The dividing line between the normal and the abnormal, however, is at times so tenuous and the question of recollection or not is involved in so much uncertainty that this factor can not be considered as a means of differentiation. Under the term sleep-drunkenness or somnolentia has been described a condition in which during apparent sleep individuals perform purposive acts, at times, of a most complex and hazardous character and of which, subsequently, they have a clear and distinct recollection. A striking instance of this disorder has recently been placed on record by Dr. E. W. Taylor.[1] An otherwise healthy man, aged 31, who for years had occasionally walked in his sleep, related that he was compelled by an irresistible impulse to leave his bed, remove a screen from a window and slide down a copper water spout to the ground, scraping his hands and feet in the act. On reaching the bottom he realized what had taken place and quietly returned to bed. He maintained that he had not lost consciousness and that he had a distinct recollection of everything that had transpired. On another occasion, in his nightshirt, he entered, through a window, the bedroom of another man. At still another time, he vaulted from a third-story window, being awakened while hanging from the sill. He had had many other experiences of a similar character. Awaking was unattended with vertigo or confusion. According to the patient's explanation, his actions were impelled by an overmastering fear from a frightful dream. He had never seriously injured anyone, but he stated that if he were forcibly prevented from making his escape from the threatened danger he would stop short of no degree of violence to attain the desired end. The condition in question has thus clearly important medicolegal bearings, as the matter of responsibility might readily be brought into question. The term somnolentia, as applied to the disorder, appears wholly inadequate, while sleep-drunkenness seems lacking in accuracy as a descriptive term. Dana considered the condition a kind of active nightmare, but it seems to be an active form of somnambulism.

1. Boston Med. and Surg. Jour., April 6, 1905, p. 398.

VACCINATION DURING ERUPTIVE STAGE OF SMALLPOX.

In a recent issue of the *Lancet*,[1] Dr. J. Cooke Hibbert claims that vaccination or re-vaccination may be successfully performed during the eruptive stage of smallpox, and cites eleven cases in support of his contention, the vaccination in these cases having been performed on the first, third and thirteenth day. This is by no means an uncommon occurrence, as has been demonstrated frequently at the Chicago Isolation Hospital. Patients vaccinated on the second and third day of the eruption, or up to the eighth day, will, as a rule, have a typical take, but not after this time. In a paper by Dr. Heman Spalding,[2] published in THE JOURNAL several years ago, reference is made to an experimental vaccination of over one hundred smallpox patients after the eighth day of the eruption. In none of these cases was there a take. The case reported by Hibbert in which vaccination was successful on the thirteenth day is probably one of a spurious type, although it might have been a perfect vaccination. These findings only prove that the tissues are not impregnated with the immunizing substances of smallpox. The fact that vaccination or re-vaccination was successful in a case having a rash of doubtful character is not an argument against that case being one of smallpox, but in such a case a positive diagnosis will have been made before there is any evidence of the outcome of the attempt at vaccination. Hence, vaccination for diagnostic purposes during the eruptive stage of any exanthem is of no value whatever.

1. Lancet, London, May 20, 1905.
2. The Journal A. M. A., Oct. 11, 1902, p. 906.

Medical News

CONNECTICUT.

Cedar Mountain Hospital.—The free bed fund for Cedar Mountain Hospital for Deserving Consumptives now amounts to more than $5,300.

Norman Kerr Lecture.—Dr. T. D. Crothers, Hartford, has accepted an invitation to deliver the first oration in the Norman Kerr memorial lectureship at London, Eng., October 10.

Personal.—Dr. Wyeth E. Ray, Hartford, has been appointed associate medical director of the Travelers' Insurance Company.——Dr. Elias B. Heady, Milford, was seriously injured August 12 in jumping from an unmanageable automobile.

Nominal Damages.—In the damage suit of Lorin A. Barnes, Torrington, against Dr. William H. Carmalt, New Haven, in which $25,000 damages was claimed for the alleged sewing up of a piece of gauze in the abdomen, in an operation, the Superior Court awarded the plaintiff nominal damages.

July Deaths.—During July 1,648 deaths were reported in the state, equivalent to an annual mortality of 20 per 1,000. Of this mortality 37.3 per cent. occurred in children under 5 years. The chief death causes were: Diarrhea, 466; nervous diseases, 159; accidents and violence, 135; consumption, 110; heart disease, 109, and pneumonia, 44. Infectious diseases caused 189 deaths, or 11.3 per cent. of the total mortality.

ILLINOIS.

Typhoid Epidemic.—Typhoid fever is said to be prevalent in and around Greenville.

Unlicensed Practitioner Departs.—David Johnson, Waukegan, who claimed to have "an interstate and international license," and was fined $100 and costs in March for practicing without a license, learning that a warrant had been issued for his arrest, fled from the city.

Chicago Deaths.—During the week ended August 26, 561 deaths were reported, equivalent to an annual mortality of 14.68 per 1,000. Of these 179 were under one year old and 230 under 5 years of age. Acute intestinal diseases caused 152 deaths; consumption, 49; violence, 34; pneumonia and heart disease, each 33; nervous diseases, 27; nephritis, 26, and cancer, 24. Typhoid fever caused 12 deaths.

Personal.—At the annual meeting of the medical staff of the City Hospital, Moline, Dr. Albert M. Beal was elected president; Dr. Albert R. Beal, vice-president, and Dr. August H. Arp, secretary.——Dr. Annie B. McCallum Alguire, Belvidere, was thrown from a buggy August 20, breaking a rib and sustaining other serious injuries.——Dr. Richard E. Shurtz, Champaign, who has been seriously ill with septicemia in Denver, is recovering.——Dr. Joseph T. White, Freeport, was operated on for appendicitis at the Wesley Hospital, Chicago, August 16, and returned home three days later.——Dr. James E. Stubbs, Chicago, who has been seriously ill with septicemia at Colorado Springs, has returned to Chicago and is improving.

MARYLAND.

Personal.—Dr. J. T. Payne has removed from Corbet to Sunnybrook, Baltimore County.——Dr. Howard Bratton of Elkton was recently thrown from his buggy and dragged some distance, being badly injured.

Open-Air Sanitarium in Blue Ridge Mountains.—Through the efforts of the Quarter Club, Baltimore, an open-air sanitarium for consumptives has been set in operation at Mount Airy, among the foothills of the Blue Ridge Mountains. It was opened July 28 and has now seven patients. It is on a high hill near the Baltimore & Ohio Railroad, and consists of a seven-room cottage, with ample porches, and six open-air shacks on the edge of a forest. The current expenses are borne by the Hospital for Consumptives of Maryland. It is to be open winter and summer, and only the most hopeful cases are to be admitted. Thus has begun unostentatiously a work which doubtless will become one of the most useful and important charities in Maryland.

Baltimore.

Removals.—Dr. H. Walker Hutchins has gone to North Liberty, Ind., to practice.——The State Board of Health has removed its offices to its old quarters in the burnt district.

Visitor from Australia.—Dr. M. U. O'Sullivan, F.R.C.S.I., senior surgeon in St. Vincent's and the Woman's hospitals, Melbourne, Australia, visited the Baltimore hospitals last week.

Typhoid Not Unusually Prevalent.—The mayor makes the statement that typhoid fever is not more prevalent here than usual at this season of the year, and that the 140 cases said to exist represent all the cases in institutions since July 1. Many of these are now well and on the street.

College Denies Indebtedness.—The answer of the Woman's Medical College to the bill filed on July 25 for the appointment of a receiver, denies that the institution is insolvent, says that the allegations of the petitioners are "recklessly and wantonly made and untrue," and avers that it has never been customary for the college to pay its lecturers for their services, and denies that it is indebted to them for such.

MINNESOTA.

Founds Hospital.—The executor of the estate of the late Mrs. Mary Elliott has conveyed from the estate property valued at $175,000 in trust for the founding of a University of Minnesota Hospital at Minneapolis, as a memorial to the late Dr. Adolphus F. Elliott.

Personal.—Dr. Jehiel W. Chamberlin, St. Paul, who sailed from Montreal for Europe July 6, sailed for home September 1.——Dr. George E. Benson, Minneapolis, has returned from Europe.——Dr. E. H. Beckman, medical inspector and assistant bacteriologist of the State Board of Health, has been elected city physician of Minneapolis.——Dr. David H. Lando, St. Paul, has been given honorable mention for a tnesis submitted at Vienna.——Dr. Frederic J. Plondke, St. Paul, is studying in Europe.

Murray County Medical Club.—Physicians of Murray County met at Slayton August 1, and organized a club to promote good-fellowship among the profession of Murray County and adjacent counties. The following officers were elected: President, Dr. Emil King, Fulda; vice-president, Dr. Walter E. Richardson, Slayton; secretary and treasurer, Dr. Leon A. Williams, Slayton; and censors and committee on medical ethics, Drs. Milton A. Trow, Avoca; George G. Balcom, Lake Wilson, and C. C. Walker, Currie.

NEW JERSEY.

Health Officers Elected.—Dr. Samuel D. Mayhew was elected health physician of Bridgeton August 24.——Dr. Duncan W. Blake was elected medical inspector of Gloucester City August 21.

Physicians Refuse Lodge Work.—All the physicians of Trenton have banded together in an effort to overcome lodge practice, and have signed an agreement not to accept contract lodge work in any form.

Milk Dealers Arrested.—Warrants have been served on two dealers at Egg Harbor to appear for adulterating food, as a result of the inspection by the State Board of Health a few weeks ago. Both men denied the charge, but will appear for trial before the Circuit Court.

Suicides Increase.—The annual report of the State Board of Health shows a material increase in the number of suicides during 1904. During the year there were 314, as compared with 265 for the previous year. The 1903 showing is at the rate of 15.70 per 100,000. Of the suicides 9 were residents of Trenton, 4 of whom took poison, 2 used firearms, 1 a knife and 1 threw himself from a height. Poison caused 153 suicides and 112 died by asphyxiation. The age most frequently selected was between 35 and 45 years. Of the number recorded 112 were born in America, 64 in Germany and 24 in Ireland.

NEW YORK.

Less Typhoid.—There is less typhoid fever in Buffalo than there was at the same time last year, but many cases of pertussis still exist.

Buffalo Personals.—Dr. Roswell Park, who with Dr. Edward McGuire, is making a short tour of Great Britain, later will attend the International Surgical Association at Brussels.——Drs. Matthew S. Mann and Herbert W. Williams are on a fishing trip in Canada.

Moving Day for Insane.—Fifty insane women, who are charity patients at Long Island State Hospital, were taken on August 22 to the Willard Parker State Hospital at Ovid, N. Y. They are the first of 400 charity patients housed in the building now to be turned into the King's County Hospital to be transferred. The others will soon be sent to the Rochester and Willard institutions.

Eddyite Cases.—The health department refused to issue a burial permit in the case of Thomas A. Chilcott, who died without medical attendance, but who was treated by Eddyites. On investigation it was shown that his case was hopeless, because he died from diabetes and diabetic gangrene. At the request of the Erie County Medical Society the district attorney is investigating the death of Mason Griffin, 2 years old, who was treated by Eddyite healers. It is charged that an irregular death certificate, signed by a doctor who had not been in attendance, was granted, and that the boy died as the result of pertussis, a contagious disease which should be reported to the health department. By order of the district attorney the body is to be exhumed and the medical examiners will hold an examination.

New York City.

Personal.—Drs. William T. Bull, William B. Coley and Walter F. Chappell returned from Europe on the *Kronprinz Wilhelm*, August 23.

Detained at Hoffman Island.—Nine cabin passengers and six of the crew of the steamship *Finance*, from Colon, have been held for further observation on account of high temperatures.

The Brooklyn Theaters Closed.—There has been some complaint that the health board has acted in a high-handed man-

ner in closing the Brooklyn theaters and condemning them as insanitary and dangerous. A statement has been given out at the headquarters of the Health Department that owners have been twice notified since April that they would have to comply with the law and that the complaints are unjustifiable.

Contagious Diseases.—There were reported to the sanitary bureau for the week ended August 19, 464 cases of tuberculosis, with 115 deaths; 252 cases of typhoid fever, with 25 deaths; 119 cases of measles, with 5 deaths; 117 cases of diphtheria, with 19 deaths; 41 cases of scarlet fever, with 3 deaths; 16 cases of cerebrospinal meningitis, with 16 deaths, and 14 cases of varicella.

Typhoid Fever on the Decline.—The figures presented day by day show a steady decline in the number of typhoid fever cases. Only 22 new cases were reported in Brooklyn from August 19 to August 23. In the same time there were 13 new cases reported in Manhattan and none in the other boroughs. Last year the climax was reached in the week ending August 27, when 82 cases were reported. The number of cases for the corresponding week this year was 252.

Richmond Waterless.—An opinion was filed on August 21 sustaining the constitutionality of the act passed by the New Jersey legislature prohibiting the diversion of potable water in New Jersey to other states. This decision will greatly disappoint Staten Island, which looked to New Jersey to supplement its painfully scant natural supply. In view of the recent scarcity of water in this locality the problem of securing a sufficient supply is serious and the necessity imperative.

PENNSYLVANIA.

Personal.—Dr. James M. Anders, Philadelphia, has returned from his trip to Alaska.

Sanitary Engineer Selected.—Dr. Samuel G. Dixon, state health commissioner, on August 25 appointed F. Herbert Snow, Boston, Mass., chief of the sanitary engineering division of the State Health Department, August 25.

Illegal Practitioner Arrested.—The United States postal authorities have started a crusade to rid Philadelphia of quacks and illegal practitioners who advertise illegal remedies and through the mails suggest illegal operations. Four persons were arrested on this charge August 21 and held, one in $1,000 and three in $800 bail each. The law makes it a criminal offense to suggest by letter where illegal medical advice may be obtained. Besides the four arrests thus far made, convicting evidence has been obtained against several other persons. Since the crusade began many of the malpractitioners have left the city.

Philadelphia Health Report.—The total number of deaths reported for the week ended August 26 aggregated 438. This is the same number as reported last week, and the week before. Such a coincidence has never been known by the local authorities. The health of the city remains good and there is a decrease in contagious diseases. The principal causes of death: Typhoid fever, 10; consumption, 41; pertussis, 5; diphtheria, 5; cancer, 12; apoplexy, 23; heart disease, 35; acute respiratory diseases, 25; enteritis (under 2 years), 59; enteritis (over 2 years), 13; Bright's disease, 39; general debility, 25; marasmus, 17, and injuries and accidents, 8.

No Temporary License.—It is not an uncommon practice for a physician to place in charge of his practice one who is not regularly licensed according to the act of assembly governing the practice of medicine in this state. Dr. Henry Beates asserts that the impression seems to prevail that such an appointment is not an infraction of the law. To show that such practice is illegal Dr. Beates has secured an official opinion from the attorney general concerning the subject, which is in part as follows:

> In my judgment this is not in accordance with the Medical Practice Act, which prevents one from opening an office and regularly establishing himself as a practitioner of medicine without having first qualified according to the statute. Duties of this character, requiring special qualifications and subject to government control as a part of the police power of the state, can not be assigned to unqualified persons. The mere fact that the assignment may last but a brief period does not alter the legal aspect of the case. The maxim of the law is *qui facit per alium facit per se*, and the agent in a matter of this sort must have the qualifications of the principal. I see nothing whatever in the law to prevent one qualified practitioner from calling on another qualified practitioner to take charge of his practice during his absence, but there is nothing whatever in the law which permits the substitution for a trained and duly qualified professional man of one who has not complied with the statute, and who, therefore, is not qualified to practice.

WISCONSIN.

Personal.—Dr. Wilbur T. Sarles, Sparta, sailed from Europe September 1.——Dr. Soren Sorenson, Racine, has been appointed head physician of the United Danish Societies of America.——Dr. Henry P. Rhode has been made health commissioner of Green Bay, vice Dr. Francis P. Thibido, who resigned after six years' service.——Dr. Henry L. Barnes, health officer of Ripon, has resigned.

Commissions on Prescriptions.—Dr. Edward A. Taylor, Racine, who was sued by a druggist for a drug bill of $70, which he refused to pay, claiming, it is alleged, that the druggist owed him $200 for business sent by him, was defeated on trial, the judge holding that contracts between physicians and druggists whereby the former receive commissions for sending prescriptions to the latter, are void and that such practices are contrary to public interest.

Must Make Reports.—The State Board of Health has issued a leaflet setting forth the law requiring reports of births, deaths and accidents. The following is a summary:

> The law provides that every attending physician practicing in this state shall report all births, deaths and accidents occurring under his jurisdiction within thirty days from the time of the occurrence.
>
> In cities *births* must be reported to the health officer.
> In cities *deaths* must be reported to the health officer.
> In cities *accidents* must be reported to the health officer.
>
> In towns and villages births must be reported to the village or town clerk; deaths must be reported to the village or town clerk; accidents must be reported to the village or town clerk. In all cases of death under your professional care you are required to certify to the health officer of cities and to the town or village clerk of towns or villages, the primary and secondary cause of death. The law requires that this shall be done before the burial permit can be issued.
>
> Fees for reporting births, deaths and accidents as above, 25 cents in each case, to be paid by the county in which they occur.

GENERAL.

Cholera in Manila.—A cable from Manila, dated August 25, states that there is an outbreak of cholera in Manila and that several natives and one American woman have died from the disease.

Tri-State Medical Society.—The seventeenth annual meeting of the Tri-State Medical Society of Alabama, Georgia and Tennessee will be held in Chattanooga, Tenn., September 26-28. The secretary is Dr. Raymond Wallace, Chattanooga, Tenn.

Health of Panama.—Acting Assistant Surgeon Mohr of the Public Health and Marine-Hospital Service reports that during July the deaths from all causes officially reported in the municipalities of Colon and Cristal was 72, excluding still births. Malarial fever has been very prevalent among the negroes and natives and is no doubt responsible for a large number of deaths. Recently large numbers of native Colombians have been brought to the Isthmus as contract laborers, and those who come from the interior of Colombia seem to be peculiarly susceptible to both malaria and yellow fever.

Health of Panama Canal Zone.—The June report of Col. F. C. Gorgas, chief sanitary officer, shows that while June, 1905, was not unusually salubrious in the city of Panama, there was nothing extraordinary in its death rate, either as compared with former Junes in the last 22 years or with other months in the last year. On the last of June over 10,000 laborers were on the government rolls. Of this number there were sick every day, on an average, 274, or 27 per thousand, a sick-rate which compares favorably with that of a similar body of laborers anywhere. Twenty-four persons died from all causes. This, if continued for the year, will give a death rate of 28.8 per thousand. In 1881, the first year of the French occupancy of the canal, the death-rate was 67 per thousand, with 11 deaths from yellow fever, a rate of 12 per thousand. During June, 1905, there were only 14 deaths from yellow fever, a rate of 3 per thousand. On the entire isthmus during the month, in a population of about 50,000 people, there were 61 cases of yellow fever with 18 deaths, a rate of about 25 per cent. Of these 61 cases, 30 were employes of the commission, of whom 4 died, a rate of about 14 per cent. Among this number were 15 Americans brought from the United States by the commission. Of these 15 one died. This difference in mortality is ascribed to the fact that the American is, on the average, in the prime of life, and in first rate condition, reports to the hospital as soon as he feels sick, and thus places himself in the best possible condition for recovery. Among the non-employes of the canal, there were 27 cases, of whom 13 died, nearly 50 per cent. These persons usually apply for treatment when they are beyond the possibility of deriving any benefit from it. One case of plague occurred at La Poca, the Pacific terminus of the canal, in the person of a negro laborer, a longshoreman who probably was infected through a cargo coming from some one of the infected ports to the south. A strict quarantine was at once established, and a rat crusade commenced. Only one infected rat was found and no other case occurred. The report also includes a detailed review of the sanitary measures

carried out by the commission of the city of Panama in the way of street and yard cleaning, garbage collection, fumigating and yellow fever prophylaxis. The city has been divided into districts, each in charge of a physician who makes a house to house inspection in order that all yellow fever suspects may be isolated and screened at once. The organization of a brigade of rat-killers is also in progress.

THE YELLOW FEVER SITUATION.

CONDITION SEEMS BETTER, BUT GREAT ALARM STILL EXISTS—SYSTEMATIZED INSPECTION BEING ESTABLISHED.

Latest Reports.

Amelioration.—As we go to press fresh news comes from all parts of the stricken region. New Orleans reports that Dr. John Archinard, attached to the Emergency Hospital, believes he has found the germ of yellow fever—an organism resembling the malarial parasite.——Conditions in the city continuing to improve, Surgeon White contemplates the transfer of some of his force to the country, where the cases increase.——Leeville is the worst afflicted locality, but with outside help some improvement is seen.——Allegation comes that the cases at Gulfport, Miss., were deliberately concealed by a diagnosis of malaria to avoid quarantine difficulties. According to the story of the Gulfport woman, who fell ill of the disease on the way to New Orleans, and whose attack led to the discovery of the other cases, some patients in Gulfport had been under physicians' care for fourteen days before she left.——It is reported that Dr. Fitchette, health officer of Natchez, refuses to accept the diagnosis of the county health officer of the presence of yellow fever cases in that town. Surgeon Young, by special train, went from Jackson to Natchez to see the cases.——Alabama has quartined against Natchez.——Texas has applied its quarantine to Memphis and to all of Mississippi.——Lunnenburg County, Virginia, reports a possible death from yellow fever.

The Record to August 30.—New deaths, August 29, 7; total deaths to date, 293; new cases, 80; total cases to date, 2,133; new subfoci, 9; total subfoci to date, 439.

Louisiana.

Record of Cases.—In New Orleans the epidemic record to August 27 was as follows:

New cases reported August 26	31
Deaths reported August 26	13
Total number of cases to August 26	1,755
Total deaths to August 26	260
Death rate of epidemic	14.8 per cent.
New foci of infection	12
Total subfoci to date	390

The reports for the week show a decreasing number of cases, but, toward the end of the week, a rise in the number of deaths. The epidemic in the city appears to be fully under control.——As showing the average health conditions of New Orleans the Board of Health has published the following figures:

Years.	Number of deaths.	Death rate per 1,000 per annum. Population.	White.	Colored.	Total.
1899	7,893	300,000	23.39	33.11	26.31
1900	7,424	300,000	20.56	34.44	24.74
1901	6,478	305,000	18.06	29.70	21.24
1902	6,572	310,000	17.91	30.18	21.20
1903	6,705	317,000	18.02	29.82	21.15
1904	6,819	325,000	17.66	30.19	20.98

Between 1879 and 1900 there were 407 deaths from yellow fever. The greatest number of deaths from that disease occurred in 1897, when 298 victims succumbed. There were no deaths from the pest in ten years of that period, and there were none in 1900-1903.——President Charles Janvier of the citizens' committee set a splendid example when arrested for failure to screen his cistern. He explained that he had oiled it, thinking that more effective. Naturally he was set free, but on hearing some adverse criticism he asked to be rearraigned and fined, which was done.——An unfortunate controversy is being waged between some members of the profession on one side and the Louisiana Board of Health and New Orleans Board of Health on the other. There is talk that the executive officer of each board will be asked to resign. The subject of the controversy is the concealment of the early cases.——In an interview Dr. John Guiteras of Havana said that it was hardly to be expected that the infection could be stamped out before frost. It was under control, but had gone too far to exterminate. He predicted that this was the last epidemic of yellow fever that would ever appear in the United States. In a later interview he predicted that the disease would be stamped out before frost, as the situation has become distinctly better.——At a mass meeting on August 23, called by Dr. Leach of arsenic fame, 300 people denounced the press, the physicians and all health officials, and promised to continue doping with arsenic. This shows clearly that Dr. Leach's presence in New Orleans at this time is wholly harmful and that his desire for notoriety is decidedly uppermost among his motives.——One case discovered August 26 was a patient recently arrived from Gulfport, Miss. Following this up, the authorities found three existing but unreported cases at Gulfport.——The public schools will not open until October 2.——Leeville on August 23 reported 177 cases of yellow fever and 200 cases of dengue.——Arrangements have been made for a drastic campaign of extermination against the disease at the various infected points throughout the state.——On August 29 35 new cases of fever were discovered in Bayou Barataria, Jefferson parish. The tour of investigation had not then been completed. Deaths had occurred and there were neither physicians nor nurses. A relief party was organized at once with physicians, nurses, medicines and supplies to assume charge of the situation.

Other States.

Arkansas.—The State Board of Health on August 21 quarantined against the entire state of Louisiana.

Illinois.—At the end of one week of train inspection at Cairo it is reported that 1,000 passengers had been inspected and 2,000 health certificates issued, seven physicians being kept busy.——Inspectors of the United States Public Health and Marine-Hospital Service have been traveling on trains running from Louisiana and Mississipi to Cairo. On August 23 Dr. Egan, secretary of the Illinois Board of Health, ordered this stopped. Dr. Egan later amended the order to admit such federal inspectors as are yellow fever immunes.——Brownsville on August 23 reported a case of yellow fever from Shreveport, La., but this was later announced as a false report.

Indiana.—Jeffersonville on August 17 had a yellow fever scare regarding the towboat *Sprague*, which was thought to be infected, having had illness on board since it left New Orleans. The health authorities ordered the boat to proceed to its destination, Cincinnati, on pain of the crew's incarceration in the pest house.——The Crawfordsville case, when seen by Dr. A. M. Brighton of Indianapolis, proved to be acute malarial fever.——Dr. Nelson W. Brayton, of the Indianapolis health office and son of Dr. A. H. Brayton, is in New Orleans studying yellow fever.——Michigan City had a small scare in the shape of an acute illness of a woman recently arrived from Arkansas.——Evansville had a supposititious case of yellow fever, but the attending physician and health officer agreed in a diagnosis of typhoid.

Kentucky.—Paducah says that if the State Board of Health persists in refusing permission to quarantine, the City Council will pass a quarantine ordinance in defiance of the board. The town has a new board of health with Dr. S. H. Brothers as president. The dispatch adds: "The old board was against a quarantine."——Jackson, Tenn., has a quarantine against Fulton, Ky., that is very annoying to the latter town.——Members of the board of health of Paducah have been charged by reliable eye-witnesses with selling certificates of health without embarrassing questions to all-comers at $1 each.——Dr. A. T. McCormack, assistant secretary of the State Board of Health addressed the City Council of Paducah, arguing against a quarantine.——The state board issued an order forbidding the Illinois train inspectors to continue their practice of discharging on Kentucky soil all passengers not admissible to Illinois.——Louisville had a small scare over a suspicious case which proved not to be yellow fever.——The city council of Henderson refused to appropriate any money for the board of health to use in preparing the city for possible infection.——The latest word from Paducah is to the effect that every one there, the physicians and board of health excepted, desires a quarantine.

Michigan.—A case of yellow fever was reported at Crockery, Ottawa County, the patient being a man just arrived from New Orleans.

Mississippi.—The early cases of yellow fever at Mississippi City were so light that the physicians mistook them for malaria, so for nearly a month the focus was unrecognized. Of course Governor Vardaman threatened the "extreme penalty" for these physicians if neglect of duty on their part could be proved. Credit for discovery of the case is claimed for Dr. Sanders and others of a party of Alabama health authorities who were making an inspection tour of the Gulf coast of Mississippi. The stegomyia was also found in large numbers.——Most of the remainder of Mississippi has quarantined against its gulf coast towns.——Vicksburg has raised its

absolute quarantine against Memphis.——Secretary Hunter of the Mississippi board of health has asked physicians to form local health associations in every county and to hold daily meetings for the discussion of suspicious cases.——Natchez, which "has been tightly bottled up with a shotgun quarantine ever since the infection of New Orleans was reported," on August 26, admitted that it had nine undoubted cases of yellow fever and three cases of suspicious illness. The news caused a panic and the pressure to escape from the city became tremendous. The Marine Hospital Service arranged for special through trains for the north for all who wished to leave and anticipated the departure within 24 hours of fully 2,000 persons.——Gulfport, on August 27, reported three new cases of yellow fever, having already during the week admitted the existence of three other cases.——Jackson, with neighboring towns and counties, has quarantined against Memphis, because a woman just arrived in New Orleans from Memphis, developed the disease.——Mississippi City has been placed under martial law by Governor Vardaman.

Missouri.—The case of yellow fever at Gregory, on the Mississippi River just below Keokuk, proved fatal. The patient was a Greek, said to have come to Gregory from Natchez, Miss. Boats touching at Gregory are not permitted to land in Keokuk.

Ohio.—It was attempted to create some excitement in Cincinnati last week over the approach up the Ohio River of the steamers *Sprague* and *J. B. Finley*, both reported to have yellow fever aboard.

Tennessee.—Search for the stegomyia at Chattanooga is reported to have demonstrated its absence at present.——Memphis reports local railway passenger business at a standstill, while through traffic keeps up pretty well.—On August 22 the Chattanooga quarantine was made still more stringent.

Texas.—A detention camp has been established on Red River for the protection of north Texas.——Orange asked that passenger traffic with Louisiana be forbidden. Here and elsewhere objection is made to the expense of detention camps, it being alleged that Louisiana at its borders should bear the detention expense of its outgoing citizens.——Galveston has been undergoing the most thorough cleaning that it has had in years, if ever.——At San Antonio $3,000 was subscribed by ward canvass and forwarded to the state health officer to aid in the quarantine work for which there is an utterly inadequate appropriation.

CANADA.

Tuberculosis Sanitarium for New Brunswick.—Physicians of New Brunswick are reported to be making an effort to obtain a sanitarium for consumptives. The St. John Medical Society has appointed a committee to collect information and to bring the subject properly before the people. It is hoped that the government will act in the matter at an early date.

FOREIGN.

Plague in the Argentine Republic.—A report from Buenos Ayres states that six cases of plague were discovered recently in Tucman.

Typhoid Fever in New Zealand.—It is reported that there have been a number of outbreaks of typhoid fever among the Maori settlements in North Island.

Typhus Fever in Ireland.—An alarming outbreak of typhus fever is reported from Donegal. Nine families have been attacked and one death is reported. The "contacts" have been isolated.

The Birth Rate in New South Wales.—According to the government statistician's report for June, 1,246 children were born in this province during the month. The excess of births over deaths was 785.

Jenner Memorial Tablet.—On August 9 the London County Council erected a tablet on the house in which Edward Jenner, the discoverer of vaccination, lived during 1803. The tablet is of green encaustic ware.

Yellow Fever in Brazil.—Acting Assistant-Surgeon Stewart reports that yellow fever is prevalent in Para. An Italian opera company there has lost so many members that it will probably be forced to disband.

Plague in Japan.—It is reported that, after a period of quiescence, plague has again made its appearance in Tokio and that the disease seems to be spreading in spite of the rigid quarantine which is enforced.

Asiatic Cholera in Prussia.—A report from Dantzig states that two Russians recently died in Culm, West Prussia, of a disease which was diagnosed as Asiatic cholera. The authorities declare that there is no danger of the disease spreading.

Medical Bequests by Physicians.—THE JOURNAL has chronicled lately a number of bequests by physicians for medical purposes. The latest is from Dr. Toporski of Posen, who left $200 to the local fund for conducting the campaign against tuberculosis.

Reduction of Rates on French Railroads for Members of Tuberculosis Congress.—It is officially announced that membership in the International Antituberculosis Congress, to be held at Paris, October 2-7, entitles one to a reduction of 50 per cent. on the railroads in France.

Second International Milk Congress.—This congress will convene at Berlin October 16-19, and will represent every phase of the milk question. There are to be six sections, one devoted exclusively to legislative measures in regard to the production, distribution, etc., of milk.

Public Disinfecting Plant for Tasmania.—The Tasmania local board of health held a conference June 28 to consider the question of erecting a public disinfecting plant in accordance with the suggestions of the health officer, Dr. Elkington. It is estimated that the capital cost of such a plant would be about $5,000.

Garre Goes to Breslau.—Karl Garré, professor of surgery at Königsberg, has accepted a call to the chair of surgery at Breslau left vacant by the death of Mikulicz. Garré was born Dec. 12, 1857, and is thus in his forty-ninth year. His works on surgery of the nerves, vessels, larynx and alimentary canal have been especially noteworthy.

Celebration of Lucae's Seventieth Birthday.—The present and former assistants of Prof. August Lucae of Berlin presented him with a *Festschrift* in honor of his seventieth birthday, August 24. The famous otologist also received many messages and telegrams of congratulations from friends and scientific bodies at home and abroad.

Smallpox in Chili.—It is reported that there is a severe outbreak of smallpox at Santiago. According to *Public Health Reports*, this is not anything unusual and is probably only a recrudescence of a disease which is always present there and is due doubtless to the cold weather which has been prevalent recently in South America.

Tests of Sight and Hearing for Government Employes.—The German department of public works has ordered that every employé throughout the department is to be tested for vision and hearing in the course of the next five years. Those found defective are to be transferred to posts of lesser responsibility or pensioned out of the service.

Physicians Must Write Legibly.—The authorities in the duchy of Hesse, Germany, have notified druggists throughout the country that when a physician's prescription is written illegibly—as frequently happens—the druggist is not to waste any time guessing at the writer's meaning, but to require from the physician a legible copy or indication of the contents.

Jubilee of the University of Melbourne.—The University of Melbourne attains its jubilee next year and preparations are already in progress to celebrate the event. It has been proposed to erect a pavilion on the cricket ground as a suitable memorial and a committee has been appointed to secure funds. It has been estimated that about $4,000 will be necessary, and of that amount about $2,000 has been promised.

Warning Against Massage and Hypodermics by Irregulars.—The Board of Public Health at Rome has issued a notice warning the public against the dangers of massage, hypodermic injections and operations of any kind by only partially qualified persons, such as nurses, midwives and others. It seems that such practices are becoming prevalent in these circles, and the public is warned of the possible danger in incompetent hands.

Prize for Work on Trachoma.—THE JOURNAL announced some time ago that the government of Hungary had offered a prize of about $500 for the best work offered in competition on the subject of trachoma. The prize was divided and half given to Professor Kuhnt of Königsberg for his essay on the subject of treatment of trachoma. The other half of the prize was not awarded, as no suitable articles on the pathology of the disease were received.

Suggestion for Prize for Remedy for Tuberculosis.—One of the members of the Brazilian parliament recently urged the adoption of a resolution endowing a prize of over a million dollars, to be awarded to anyone discovering a sovereign remedy for tuberculosis. It will be remembered that the French *Académie de Médecine* has an endowment representing an an-

nual income of several thousand dollars, which is awaiting the discoverer of such a remedy.

The Brisbane Hospital.—The financial condition of the Brisbane Hospital is reported to have been very unsatisfactory for some time. At the end of June the executive committee found themselves without funds and in debt for a large sum for current expenses, besides the amount due the government as interest on a loan of $15,000. Finding themselves in this position the members of the committee decided to resign in a body, and the resignations were handed to the home secretary July 10.

New York's Board of Public Health from the German Point of View.—One of the meetings of the Berlin Medical Society this summer was given up to a description of the scope and workings of the New York Board of Health. The speaker was Prof. A. Wassermann, and he drew a very complimentary picture of the great work accomplished by the board, contrasting it with the apathy displayed by the city authorities of Berlin, who, he stated, are far behind the times in the matter of municipal protection of the public health.

A Medical Prince and the Wily Irregular.—A certain Grundlach of Munich recently published a pamphlet denouncing mercurial treatment of syphilis. He represented to Prince Ludwig Ferdinand of Bavaria, who is a registered and practicing physician there, that certain of the medical authorities, citing them by name, indorsed his views. On this representation the prince wrote a complimentary preface to the work. The local medical society at once interviewed the prince, who has since publicly retracted his statements, explaining that they were obtained under false pretenses.

Decline of Cholera in Russia.—The *St. Petersburg med. Wochft.* for August 5 states that it has been officially announced that not a single case of cholera has been known to occur in Russia since April. The suspicious cases at Lodz, Wilna, Tomsk and elsewhere proved to be some other disease on microscopic examination or on the evidence of the course of the disease or the postmortem findings. Sanitary precautions are still maintained along the frontier, but the local campaigns inaugurated at various points have been suspended and the physicians recalled to their posts.

Mortality Among Physicians.—The *Deutsche med. Wochft.* summarizes in a recent issue the article published in THE JOURNAL on "The Mortality of American Physicians." It cites in addition the average length of life among the physicians of France as 64.75 years. In the northern regions the average was only 58.3, while it reached nearly 71 in the Albi and Gaillac districts. An unusually large proportion of the medical men of France are now in the seventies. Only one French physician in the last two centuries lived to be over 100, and only 2.16 per cent. passed the ninety mark.

Quinin Prophylaxis of Malaria in Italy.—The *Riforma Medica* for July 22 states that at the last official conference of the Society for the Study of Malaria, Professor Celli related that the number of persons "prophylaxized" with quinin in the Roman district has increased from 1,175 to 30,000 in the last three years, while the number of cases of malaria treated in the hospitals has decreased from 6,000 to less than 3,000 during this time. In the Italian army the morbidity from malaria has dropped from 67 to 10 per cent., and among the railway employes from 69 to 33 per cent. The general mortality has fallen from 13,000 to 7,000 since the legislation was adopted providing free quinin for the people.

Chair of Protozoology in the University of London.—A chair of protozoology has been founded in the University of London. The secretary of state for the colonies offered the university a sum of $35,000 for the establishment of the chair. The *British Medical Journal* states that of this amount $1,000 is a contribution from the Rhodes trustees and that $25,000 represents a moiety of a grant originally made from the Tropical Diseases Research Fund to the Royal Society for the Promotion of Research Work, and surrendered by that society for the purpose of establishing this chair in the university. The university senate has decided to devote the whole amount to defraying the salary of a professor and to set aside a further sum of $1,000 a year for assistants and laboratory expenses.

Organization of the Profession in Germany.—The conflict between the sickness insurance companies and their medical officers over the demand of the latter for increased remuneration when the period of treatment was doubled in length, has been chronicled again and again in these columns. One of the few places where the physicians were supposed to have lost the battle was at Mülheim, where the companies imported enough "strike breakers" to answer their purpose and ignored their former medical officers completely. Time has shown, however, that the medical men willing to serve as strike breakers were below the standard of scientific acquirements required for the positions. One by one they have had to be dismissed and the terms of the former medical officers accepted, followed by their reinstatement.

Political Attitude of Physicians in Russia.—We learn that the editor of the Journal of the National Pirogoff Association, Dr. Popoff, has been held responsible for the revolutionary resolutions passed at the last conference and mentioned in THE JOURNAL at the time. The publication was suspended by the authorities and the editor placed under surveillance. The collaborators on the publication and more than fifty of the physicians of Moscow have since voluntarily proceeded to the authorities and announced that they share the views of the editor-in-chief, that they assume equal responsibility with him for the resolutions adopted and for the transactions and comments published in the journal. An all-Russian congress of odontology was recently held at St. Petersburg, and seventy of the members also publicly proclaimed their unqualified endorsement of the revolutionary resolutions passed by the Pirogoff congress.

Sanatoria for Lung Affections in Germany.—The rapid growth of the sanatorium movement in Germany is seen by the statistics recently published. There were only three in 1892, and only 13 as late as 1897, while now there are 68 official and 27 private institutions of the kind. The Red Cross took the lead in the movement, but was soon seconded by the societies insuring against sickness. The latter devoted special attention to the curable cases of pulmonary affections, and 11 of these regional sickness insurance societies now have sanatoria of their own, as also a number of cities and communities, including Berlin, Leipsic, Saarbrucken and Wittich. The sanatorium movement was the logical consequence of the compulsory insurance of wage-earners against sickness. The education in hygiene acquired by those taking a course at a sanatorium and sown abroad by them afterward throughout their environment is one of the greatest benefits of the movement.

Infectious Diseases in Australia.—Though scarlet fever was considerably less prevalent in Sydney in 1904 than in 1903, the incidence continued high, and amounted to 2.4 per 1,000 of the estimated population. The recorded monthly number of attacks showed very little fluctuation until August, when it began to rise, reached a maximum of 188 in October, and thereafter fell to 136 in December; 530 males were attacked, as against 831 females. Between December 8 and 24 a localized outbreak of scarlet fever, numbering 23 cases, occurred in adjoining portions of the three contiguous boroughs of Ashfield, Burwood and Drummoyne. This was confined to the customers of a dairy situated in Drummoyne. The outbreak was less sudden in its manifestation than is usually the case with milk epidemics. Fourteen deaths occurred from scarlet fever, corresponding to a mortality of 0.02 per 1,000 of the estimated population of the metropolis. This death rate is the lowest recorded since the year 1900. The case fatality equaled 1.03 per cent. of notified cases, and is lower than that of any year since 1898. More attacks of diphtheria were notified than in any previous year. The number of reported cases was 738, which is equal to an attack rate of 1.43 per 1,000 of the estimated population.

Correspondence

Cats as a Factor in the Propagation of Infectious Diseases.

WORCESTER, MASS., Aug. 2, 1905.

To the Editor:—A research study is being made at Clark University in reference to the possible causal relation of cats as a factor in propagating infectious diseases, especially those of children.

I wish to make an appeal through your columns to the readers of THE JOURNAL who have observed any communication of disease from cats to human beings and to ask them kindly to put me in possession of such facts. This would aid materially in deciding to what extent the cat may be a source of danger in the transmission of communicable diseases.

C. A. OSBORNE, M.D.

Association News

Next Annual Session.

The next annual session of the American Medical Association will be held in Boston, Mass., June 5 to 8, 1906.

The Card Index and Directory.

Two weeks ago we printed in our advertising pages a blank for information for the Biographical Card Index and for the American Medical Directory. While many have filled out and returned this blank, the number who did so is comparatively few. We include the blank in our advertising pages this week —see page 31—and hope those who have not already done so will fill in the blank, and return it at once. The more cooperation we get in this work the less expense will be attached to it. The ultimate object is not a commercial one, but the good of the profession. It should be understood that the information asked for is primarily for the Biographical Card Index; only a portion will be used for the directory.

Marriages

SANDY B. HARRELL, M.D., Nashville, Tenn., to Miss Eva Stockdell, at Atlanta, Ga.

CHARLES F. VOYLES, M.D., Murdock, Ill., to Miss Hazel Wagner of Newman, Ill., August 16.

CHARLES GORDON ABELL, M.D., to Miss Grace Fish, both of Enosburgh Falls, Vt., August 30.

WILLARD C. SELOVER, M.D., to Miss Minnie Carson Hill, both of Stanley, N. Y., August 16.

WILLARD EARL QUILLIAN, M.D., Atlanta, Ga., to Miss Laurie May Cassilly of St. Louis, August 15.

JOHN STEELE SWEENEY, M.D., Chicago, to Miss Grace Hamilton of Two Rivers, Wis., August 16.

WALTER E. MURPHY, M.D., Cincinnati, to Miss Mathilde Calhoun of Covington, Ky., August 22.

WILLIAM N. STEIN, M.D., Shanandoah, Pa., to Miss Maggie D. Martin of Blair Hill, Coatsbridge, Scotland, August 23.

Deaths

Jared E. Cone, M.D. State University of Iowa Medical Department, Iowa City, 1882, a member of the American Medical Association, Ohio State Medical Society, Ohio Pediatric Society, treasurer and former president of the Mahoning County Medical Society; coroner of Brule County, S. D., from 1883 to 1886; surgeon to the Mahoning Valley Hospital; one of the most prominent practitioners of Youngstown, Ohio, died at the Mahoning Valley Hospital August 24, from rheumatic endocarditis, after an illness of four weeks, aged 55.

Marcellus H. Felt, M.D. Dartmouth Medical School, Hanover, N. H., 1877, treasurer of the New Hampshire Medical Society for fifteen years and last year its president; a member of the Hillsboro Bridge school board for twenty years; representative in the legislature in 1893 and 1894; state senator in 1902; medical referee for the district, died at his home in Hillsboro Bridge, August 21, aged 60.

Charles H. Andrus, M.D. College of Physicians and Surgeons in the City of New York, 1845, surgeon of the One Hundred and Twenty-Eighth New York Volunteer Infantry, and brigade surgeon in the Civil War; coroner of Dutchess County, N. Y., in 1871; for many years a practitioner of Poughkeepsie, died at the home of his son in Enfield, Mass., August 12, aged 82.

Will Rininger, M.D. Marion-Sims College of Medicine, St. Louis, 1899, a member of the American Medical Association and the St. Louis Medical Society; assistant professor of nervous diseases and internal medicine in the Marion-Sims-Beaumont College of Medicine, St. Louis, and a young man of bright promise, was fatally burned by an explosion of benzine at his home, August 22, and died forty-five minutes later, aged 31.

Franklin Gillespie, M.D. Department of Medicine of the University of Pennsylvania, Philadelphia, 1889, of Oxford, Pa., a member of the American Medical Association, was struck by a train at Barnsley, Pa., while making a professional call, August 23, and died a few hours later, as he was being carried into his house, aged 45.

Robert W. Hinds, M.D. Vanderbilt University Medical Department, Nashville, Tenn., 1902, assistant city bacteriologist and chemist of Atlanta, Ga., and assistant secretary of the State Board of Health, died at his home in Atlanta August 18, from typhoid fever, after an illness of six weeks, aged 26.

William D. Nutter, M.D. University of Vermont Medical Department, Burlington, 1887, of Malden, Mass., and city physician from 1892 to 1895, died on Bustin's Island, Casco Bay, Maine, August 18, after an illness of nearly three years, from diabetes, aged 45.

James Henry Salisbury, M.D. Albany (N. Y.) Medical College, 1850, an early research worker on the germ theory of disease, died at his country home in Dobbs' Ferry, N. Y., August 28, from cerebral hemorrhage, after an illness of four years, aged 81.

John S. Morey, Jr., M.D. Department of Medicine of the University of Pennsylvania, Philadelphia, 1877, some-time postmaster of Royersford, Pa., died at his home in that place August 18, after a long illness, from cerebral hemorrhage, aged 59.

Joseph Plumb Cochran, M.D. College of Physicians and Surgeons in the City of New York, 1877, a native of Oroomiah, Persia, who built the first hospital in Persia, died recently at his home in Oroomiah, from typhoid fever, aged 50.

Joseph Baldwin Amos, M.D. University of Maryland School of Medicine, Baltimore, 1854, one of the oldest practitioners of Pennsylvania, died at his home in Chanceford, York County, Pa., August 20, after a prolonged illness, aged 79.

John A. Morton, M.D. Medical School of Maine at Bowdoin College, Brunswick, 1862, assistant surgeon of the Twenty-fourth Maine Volunteer Infantry during the Civil War, died at his home in Bethel, Maine, August 17, aged 71.

George B. Nichols, M.D. Castleton, (Vt.) Medical College, 1852, said to have been the oldest practitioner in Allegan County, Mich., died at his home in Martin, Mich., August 15, after an illness of several weeks, aged 72.

Edward Erskine, M.D. Michigan College of Medicine and Surgery, Detroit, 1891, a member of the American Medical Association, and an old resident of Rogers City, Mich., died at his home in that city, August 12.

Charles W. Fordyce, M.D. College of Medicine University of Southern California, Los Angeles, 1905, an interne in the German Hospital, Los Angeles, was drowned while swimming in the Kern River, August 20.

S. B. Hotchkiss, M.D. Bellevue Hospital Medical College, New York City, 1871, who had been an invalid for seven years, died suddenly at his home in Edinboro, Pa., August 16, from angina pectoris, aged 63.

Jacob W. Mooar, M.D. Dartmouth Medical School, Hanover, N. H., 1862, surgeon during the Civil War and an old practitioner of East Manchester, N. H., died at the Elliott Hospital, Manchester, August 12.

Marion Wells Thomas, M.D. University of Michigan Department of Medicine and Surgery, Ann Arbor, 1898, a medical missionary, died at her station on Bahrein Island, Persian Gulf, recently, aged 31.

Charles E. Bushnell, M.D. University of Vermont Medical Department, Burlington, 1869, died at his home on Smith Hill, Winsted, Conn., August 19, from heart disease, after a long illness, aged 61.

John Gorin Harvey, M.D. University of Louisville (Ky.) Medical Department, 1862, died at his home in Blue Mound, Ill., August 16, from general debility, after an illness of one year, aged 66.

Henry W. Giles, M.D. Albany (N. Y.) Medical College, 1874, who never practiced medicine, but devoted himself to his profession of music, died at his home in Albany June 5, after a long illness.

John M. McGroth, M.D. Department of Medicine of the University of Pennsylvania, Philadelphia, 1858, of Philadelphia, surgeon during the Civil War, died at Delair, N. J., August 22, aged 71.

Edmund W. Holmes, M.D. Department of Medicine of the University of Pennsylvania, 1880, of Philadelphia, died suddenly from heart disease in a street car in that city, August 28.

Augustin S. Clark, M.D. Starling Medical College, Columbus, Ohio, 1860, one of the oldest physicians of Washington County, Ohio, died at his home in Beverly, August 18, aged 84.

Lorenzo Traver, M.D. Albany (N. Y.) Medical College, 1857, from 1861 to 1868 acting assistant surgeon, United States Navy, died recently at his home in Providence, R. I., aged 70.

Lewis W. McCawley, M.D. Barnes Medical College, St. Louis, 1900, of Kell, Ill., was drowned while fishing in the Little Wabash River near Clay City, August 17, aged 31.

Charles N. Frederick, M.D. Department of Medicine of the University of Pennsylvania, Philadelphia, 1865, of Valley Forge, Pa., died at Strafford, Pa., August 19, aged 66.

Sarah B. Fleming, M.D. College of Medicine, Syracuse (N. Y.) University, 1873, died at her home in Coronado, Cal., August 25, after a long illness, aged 74.

Louis Gustave Guibert de la Mache, M.D. Ohio Medical University, Columbus, 1903, died from articular rheumatism at his home in Arnold, W. Va., August 15.

Ferdinand S. Overfield, M.D. University of Heidelberg, Germany (Years of Practice, Illinois, 1887), died at his home in Brookville, Ill., August 16, aged 76.

Seth Grout, M.D. University of Michigan Department of Medicine and Surgery, Ann Arbor, died suddenly at his home in Auburn, Kan., August 5, aged 72.

William J. Andrew, M.D. Manitoba Medical College, Winnipeg, 1903, of Winnipeg, died at the Winnipeg General Hospital, August 20, from scarlet fever.

William D. Pettus, M.D. University of Nashvile Medical Department, 1868, died at his home in Republic, Ala., August 14, after a lingering illness, aged 62.

David A. Baldwin, M.D. New York University, New York City, 1849, died at his home in Englewood, N. J., August 11, from senile debility, aged 79.

John Gray Hughes, M.D. Jefferson Medical College, Philadelphia, 1853, died at his home in Altoona, Pa., from heart disease, August 23, aged 77.

Edward W. Doty, M.D. Long Island College Hospital, Brooklyn, N. Y., 1886, formerly of Paterson, N. J., died in Dover, N. J., August 20, aged 49.

George M. Rice, M.D. Hospital College of Medicine, Louisville, 1894, died from tuberculosis at his home in Powersburg, Ky., August 20, aged 38.

Tilghman D. Koons, M.D. Pennsylvania, 1878, while despondent, shot and killed himself at his home in Philadelphia, August 22, aged 52.

John Ebeling, M.D. New York City, 1882, of New York City, died suddenly, August 20, while on his way to Pine Ridge, N. J.

Deaths Abroad.

K. Wernicke, M.D., one of the most prominent neurologists of the day, succumbed recently to the immediate consequences of a bicycle accident while on a tour in Thuringia, aged 57. His labors to supply a scientific foundation for psychiatry in the pathology of the brain have accumulated a wealth of data which will supply a field for research for many years to come. He was one of the principal creators of the modern anatomy of the brain, and was the originator, at 26, of the present conception of aphasia and its pathologic basis. Fuchs styles this "the first work that bridged the gap between mental disease and morbid processes in the brain." Wernicke was the first to describe the pupil reaction in hemianopsia and the processes in hemorrhagic polioencephalitis. He studied medicine at Breslau and was assistant to Neumann and Westphal for a time, was appointed professor at Breslau in 1890 and at Halle in 1904. History records that he was the first to locate a neoplasm in the brain and systematically proceed to order its removal. This was as long ago as in 1882, and he is thus said to be the founder of surgery of the brain.

P. Schech, M.D., professor of laryngology at Munich, died July 1, aged 60. He bequeathed $500 to the local endowment for the widows and orphans of physicians.

W. Flemming, M.D., professor of anatomy at Kiel, noted for his pioneer research on cell development and pathology, died at Kiel, August 5, aged 62.

B. Honsell, M.D., professor of surgery at Tübingen, died at Carlsruhe, July 22, after a long illness, aged 35.

E. Schonberg, M.D., professor of gynecology and pediatrics at Christiania, died July 20.

F. Fischer, M.D., professor of surgery at Strasburg, died July 9, aged 50.

L. D. Moussons, M.D., professor of gynecology at Bordeaux, died July 7.

The Public Service

Army Changes.

Memorandum of changes of stations and duties of medical officers, U. S. Army, week ending Aug. 26, 1905:

Kennedy, James M., asst. surgeon, ordered to accompany 17th infantry from Presidio of San Francisco, to Fort McPherson, Ga., then return to his station.

Baker, Frank C., asst. surgeon, ordered to proceed with infantry team from Fort Sheridan, Ill., to Sea Girt, N. J., to take part in national match.

Krebs, Lloyd Le R., asst.-surgeon, assignment to duty in the United States Transport Service revoked.

Porter, Ralph S., asst.-surgeon, assigned to temporary duty as transport surgeon on the *Buford* during the next voyage to Manila, where he will report for assignment in compliance with orders heretofore issued.

Metcalfe, R. F., asst.-surgeon, assigned to temporary duty as surgeon on the *Buford* during the next voyage of that transport from Manila, P. I., to San Francisco, Cal., and on arrival at the latter place to report by telegraph to the Military Secretary of the Army for orders, as heretofore directed.

Boyer, Perry L., asst.-surgeon, granted one month and eight days leave of absence, with permission to apply for two months' extension.

Yost, John D., asst.-surgeon, advanced to rank of captain, to date from July 2, 1905.

Rutherford, H. H., asst.-surgeon, advanced to rank of captain, to date from Aug. 16, 1905.

Crabtree, Geo. H., asst.-surgeon, will make one visit per day from Fort Jay, N. Y., to Fort Wood, N. Y., during the illness of the surgeon at that post.

Kennedy, Jas. M., asst. surgeon, granted 30 days' leave of absence, to take effect on completion of duty with troops to Fort McPherson, Ga., with permission to apply for thirty days' extension.

Duncan, Wm. A., asst.-surgeon, relieved from duty at Fort Leavenworth, Kan., and ordered to Manila, P. I., for duty in Philippines Division.

Harris, Jesse R., asst.-surgeon, leave of absence further extended thirty days.

Carroll, James, asst.-surgeon, detailed to represent medical department of the Army at the thirty-third annual meeting of the American Public Health Association, to be held at Boston, Mass., Sept. 25 to 29, 1905.

Hansell, H. S., asst.-surgeon, ordered, on departure of Company B 9th Infantry from Pekin, China, to proceed to Manila, P. I., and report to commanding general, Philippines Division, for assignment to duty.

Shellenberger, James E., contract surgeon, granted leave of absence for one month.

Long, Charles J., dental surgeon, left Fort Snelling, Minn., on leave of absence for one month and seven days.

Peddicord, Harper, contract surgeon, departed from Vancouver Barracks, Washington, on three months' leave of absence.

Woods, O. W., contract surgeon, will proceed from Vancouver Barracks, Washington, to Fort Walla Walla, Washington, for duty, to accompany headquarters band and Troops A, B and C, 4th Cavalry, to San Francisco, Cal., on completion of which he will return to his proper station.

Whitney, W., contract surgeon, left Columbus Barracks, Ohio, with detachment of recruits en route to Fort McDowell, Cal.

Stone, Frank P., dental surgeon, leave of absence extended seven days.

Slater, Ernest F., contract surgeon, left Fort Hancock, N. J., on leave of absence for seven days.

Girard, Joseph B., asst. surgeon general, ordered to proceed to Manila, P. I., for duty in Philippines Division.

Navy Changes.

Changes in the Medical Corps U. S. Navy for the week ending Aug. 26, 1905:

Peck, A. E., P. A. surgeon, commissioned P. A. surgeon with rank of lieutenant from March 27, 1904.

Russell, A. C. H., surgeon, detached from the *Newark* and ordered to the Bureau of Medicine and Surgery, Navy Department.

Stepp, J., P. A. surgeon, detached from the *Topeka* and ordered home to wait orders.

Wood, F., pharmacist, retired, detached from the Naval Medical School, Washington, D. C., and ordered home.

Public Health and Marine-Hospital Service.

List of changes of station and duties of commissioned and non-commissioned officers of the Public Health and Marine-Hospital Service for the seven days ending Aug. 23, 1905:

Stoner, J. B., surgeon, granted seven days' leave of absence from Aug. 9, 1905.

Stansfield, H. A., P. A. surgeon, directed to report at Bureau.

Stansfield, H. A., P. A. surgeon, granted leave of absence for one month, or so much thereof as may be necessary, on account of sickness.

Gustetter, A. L., acting assistant surgeon, granted leave of absence for ten days from Aug. 16, 1905.

Stevenson, J. W., acting assistant surgeon, directed to report at bureau for consultation.

Troxler, R. F., pharmacist, granted seven days' leave of absence from Aug. 16, 1905, under paragraph 191 of the regulations.

Hall, L. P., pharmacist, leave of absence for thirty days, amended to read twelve days from Aug. 4, 1905.

BOARD CONVENED.

Board to meet at San Francisco, Aug. 24, 1905, for physical examination of Engineer Maxwell, Revenue Cutter Service. P. A. Surgeon J. M. Holt, chairman. Acting Asst.-Surgeon A. Weeks, recorder.

Book Notices

FIRST AID FOR PERSONS OVERCOME BY GAS. Cloth. Pp. 15. With 15 illustrations. Philadelphia: United Gas Improvement Co.

This little booklet gives valuable instruction in caring for and resuscitating individuals overcome by gas. The methods of performing artificial respiration, etc., are shown by means of excellent illustrations. While primarily intended for the laity, it should be a valuable addition to the physician's library. For a gas company to issue such a book is distinctly to be commended, being in line with the discussion quoted in THE JOURNAL July 15, 1905, page 211.

FRAMES AND LENSES. A Practical Treatise for Optometrists. Illustrated. By R. M. Lockwood. Paper. Pp. 87. New York: Frederick Boger Publishing Co.

This book describes the manufacture of lenses, the manner of surface polishing and of testing the uncut lenses. Two chapters are devoted to facial measurements and emphasis is laid on the importance of accuracy. The little book will interest any one who prescribes glasses.

SELECT METHODS IN FOOD ANALYSIS. By Henry Leffmann, A.M., M.D., Ph.D., and William Beam, A.M., M.D., F.I.C. With 55 Illustrations. Second Edition. Revised and Enlarged. Cloth. Pp. 396. Price, $2.50 net. Philadelphia: P. Blakiston's Son & Co. 1905.

One of the most popular of the series of analytical books of Dr. Leffmann now in the second edition. Revised and brought up-to-date, having largely drawn on the excellent work now done in this country in the line of food analysis by government and state and by local boards and associations. Many additions are noted, such as detailed descriptions of special arrangements for polarimetry, distillation and extraction, new processes for detection of colors used as substitutes for natural colors of fruits and eggs; improved methods for detection of formaldehyd and saccharin; rapid methods for examination of vanilla and lemon essences; for determining fat in condensed milk and cereal foods, boric acid in fruit juices, together with analytic data concerning preserved fruits and their preparations. While no information concerning the lines in regard to adulteration or discussion of food standards are given, the U. S. Government standards are included as official interpretation of analytic data.

OUTLINES OF INORGANIC CHEMISTRY. By F. A. Gooch and C. P. Walker. Cloth. Pp. 514. Price, $1.75 net. New York: The MacMillan Co. 1906.

The subject is presented through such experimental work as has long been tested in college and in such relation as to facilitate drawing the deductions essential to a proper comprehension. The consecutive experimental development of the principles on which systematic chemistry rests is considered, together with the electrical phenomena and ions and the constitution of the acids, bases and salts from the ionic point of view, and the thermal relations based on the recognition of equivalents, electrical, chemical and thermal. The molecule in its relation to the atom, in the light of the kinetic theory of gases, in the theories of Van t'Hoff and Werner, the phenomena of solutions, the electrolytic theory of dissociation and the modern conceptions of the ions are all discussed. The elements, their compounds and properties are considered in accordance with the periodic system. Graphic symbols are used because their real functions for co-ordinating facts are rarely misinterpreted. The ionic terminology is employed and the functions of ions are pointed out, but the extreme developments of free ions have not been introduced.

MANUAL OF GYNECOLOGY. By D. Berry Hart, M.D., F.R.C.P.E., F.R.S.E., Lecturer on Midwifery and Gynecology School of the Royal College, Edinburgh, and A. H. Freeland Barbour, M.A., B.Sc., M.D., F.R.C.P.E. F.R.S.E., Lecturer on Midwifery and Diseases of Women, School of the Royal Colleges, Edinburgh. With 12 Lithographs and 359 Woodcuts. Sixth Edition. Cloth. Pp. 736. Price, $6.00. Chicago: W. T. Keener & Co. 1905.

In this, the sixth edition of this manual of gynecology, the whole text has been carefully revised and brought up to date. The subject matter is well arranged and the illustrations are excellent. The appendix includes a chapter on preparation for and technic of abdominal section in gynecologic cases, and a practical method of taking histories in these cases. There is also a very complete list of works on gynecologic subjects in English, German and French, with authors, which should facilitate reference work.

A HAND-BOOK OF NURSING. Revised Edition. For Hospital and General Use. Published under the Direction of the Connecticut Training-school for Nurses. Cloth. Pp. 319. Price, $1.25. Philadelphia: J. B. Lippincott Co. 1905.

This book is distinguished from some other works on the same subject by providing instruction for hospital nurses in preparation for their work later in private families. The nurse's relation to the patient, to the family and to the physician are clearly set forth. The chapter on family hygiene, while not exactly pertaining to nursing, is of practical value.

Miscellany

THE LANE LECTURES.

INTERESTING ACCOUNT OF THIS SERIES OF LECTURES AT COOPER MEDICAL COLLEGE, SAN FRANCISCO.

The Lane Lectures for 1905 were delivered during the week beginning August 13 by Sir Patrick Manson, the eminent authority on tropical diseases, who took for his subject some of the more important aspects of tropical medicine. Sir Patrick began his first lecture by remarking that thirty years ago there was no tropical medicine to speak of, and cited various important diseases discovered since that time to substantiate this view. He pointed out the importance of helminthology in the study of disease, and suggested that it served as an excellent introduction to the study of the more complicated bacteriology. He spoke of the increasing importance of the protozoa in pathology, and the gradual usurpation of this class of parasites of the premier place hitherto held by bacteria. The great importance of insects in the transmission of certain classes of disease was discussed in a general way, the work of Ross receiving special attention. After these introductory remarks, and a few words as to the likelihood of San Francisco becoming a center for tropical disease, the speaker briefly outlined the ground which he proposed to cover in his course of ten lectures.

The first lecture was mainly taken up with the consideration of certain general principles determining the occurrence of disease in the tropics. The speaker pointed out first that like the larger animals and plants, disease germs were unevenly distributed over the earth. The important factor in determining differences in distribution is the climate, and particularly the temperature. As a result of climatic differences the regular flora and fauna vary in different climates but the bacterial flora and fauna show no such marked variation in distribution as their normal habitat is the body of man, which shows practically no variation in different parts of the world. Though practically all the diseases of temperate climates can flourish in the tropics there are some tropical diseases which can not spread in temperate climates even if they are introduced there. In connection with the introduction of tropical diseases into colder climates the lecturer spoke of the latency of certain tropical diseases, a factor which is often overlooked, and which leads to errors in diagnosis. He cited as examples cases of blackwater fever and sleeping sickness which had developed in England months or even years after the individual had been in the tropics. After referring to one or two diseases, as tinea impricata and pinta, which can not be exported from the tropics because the moisture and temperature conditions are lacking elsewhere, the lecturer explained why certain tropical diseases can be exported to, but can not be spread in, temperate climates. The reason generally has to do with the life history of the parasite causing a given disease during the period in which it is passing, or being carried from one human host to another. Some parasites, as the uncinaria, have undergone development in earth for a certain period of time before they can reinfect man. If this earth is not of the proper temperature the embryos cannot develop and therefore are incapable of infecting man. Other parasites need for their development water at a certain temperature found only in tropical countries. Again an intermediate host, found only in the tropics, may be needed for the full development of the parasite, or the parasite may be unable to escape from the body without the aid of some tropical suctorial insect. In other instances some large

tropical animal carries the cause of a given disease in its body and keeps it alive until the necessary human victim comes along. In certain toxic diseases certain media found only in the tropics, and a tropical temperature may be needed before the poisons will develop.

As his first example of a disease whose parasite needed intermediary development at a high temperature Sir Patrick Manson cited ankylostomiasis (uncinariasis). In a general way he traced out the factors concerned in the spread of the disease and in its prevention. He supported Loos' view that infection occurs through the skin, cautioned as to the danger of the disease spreading, and emphasized the necessity for examination of the stools in all obscure and resistant cases of anemia. He emphasized the danger from Porto Ricans, already pointed out by Gunn, and called attention to the Chinese as sources of infection.

He next considered diseases in which the embryo escapes into water and undergoes development in the interior of water animals before becoming infective for the human being. As an example of this form of infection he cited dracontiasis or guinea-worm disease. He gave an interesting description of the life history of the guinea worm (*Dracunculus medinensis*) showing that in all probability it penetrates through the skin, especially in those portions most likely to come in contact with water, giving the history of its development in the subcutaneous tissues, its approach to the surface when it is full of embryos, and its method of expelling these when the infected part is brought in contact with water. He described the life history of the embryos in water, their development in certain varieties of cyclops, and their probable fate so far as this could be surmised from knowledge and analogy. He advised American physicians to be on the lookout for this disease in those returning from the tropics with small leg ulcers with central openings, and cautioned against meddlesome attempts at removing the worm before all its embryos had escaped, which treatment he aptly compared to meddlesome midwifery. As a second example of this type of disease he cited the parasitic hemoptysis of Formosa and Japan, due to infection with the lung fluke (*Paragonimus westermanii*). He pointed out that this parasite has been described by Ward and others in the United States in cats, dogs, and pigs, and hazarded the opinion that human infections would, in the course of time, be discovered here. He described the life history of the organism as far as known, and pointed out the necessity for wider knowledge, as, once in the body, we are powerless to remove the flukes, except in rare cases of brain infection with localizing symptoms. The third form of parasite requiring development in water which the lecturer described was the *Schistosomum hematobium*, the cause of bilharziasis. He described the life history of this trematode in the body, showed that the localization of the ova in the bladder and rectum resulted from an attempt to reach the outer world and their natural habitat water, and described the development of the embryo from the egg as far as this is known. Attention was called to the fact that the disease exists in the West Indies, has been imported into the United States, and may become distributed in this country. The lecturer called attention to the new Asiatic representative of this family, the *Schistosomum cattoi*, and in discussing the peculiarities of the eggs of the vesical and rectal infections, suggested that there were probably several varieties of Schistosomum. He dwelt on the susceptibility of cats to this infection as a factor which made the possibility of infection of this country more likely, and suggested the examination of the urine in all doubtful cases of hematuria, and of the feces in all obscure rectal irritations for the characteristic ova.

Dr. Manson then took up the discussion of those tropical diseases which are limited in range on account of requiring certain suctorial insects as intermediate hosts. He considered first the various forms of filariasis, pointing out that the canine form occurs in this country, and that other forms may occur. He described the habitat of the adult worm in the lymph vessels, the passage of the embryos into the blood, their removal by certain varieties of mosquito, and their subsequent development in the stomach and muscles of the host. He then described how they passed into the neighborhood of the proboscis, and escaped into the new human host at the time that the insect bit. He discussed the relation of this form of infection to endemic elephantiasis, lymph varices, and chyluria, and remarked on the mystery of the periodical disappearance of the embryos from the blood, which has never been satisfactorily explained. Malaria was next considered, and a very interesting comparison was drawn between the early stages of the filarial embryo and the malarial parasite; in both diseases the parasite reaches a non-motile or restrictedly motile stage in the blood, in both instances it is protected from injury by a covering (in the filaria its sheath and in the plasmodium the red corpuscle), and both parasites undergo further development only in the tissues of the mosquito. The description of the malarial parasite was clear and interesting, and the relation of this disease to the mosquito was proved, as the lecturer said, "to the hilt." Dr. Manson expressed the belief that mosquito transmission was probably the only method of transmission of this disease. The prophylaxis of the disease, and the history of its introduction into new territories was discussed.

The subject of trypanosomiasis, and the relation of trypanosomes to sleeping sickness was next discussed. A clear clinical description of infection with the *Trypanosoma gambiense* followed the lecturer's remarks on the structure of trypanosomes in general. This form of trypanosomiasis is characterized by a low form of fever, muscular weakness, an erythematous skin eruption of a smudgy ill-defined character, patchy edema, tachycardia, enlargement of the spleen and lymph glands, and an increase in the large mononuclears of the blood. In connection with trypanosome infections Dr. Manson discussed at length the relation of these parasites to sleeping sickness. He described the spread of this peculiar and fatal disease from a small area on the West coast of Africa to the East Coast, and commented on the ravages it had made in certain sections, particularly in Uganda. He graphically described the clinical picture, the low fever, the headache, lassitude followed by lethargy, the pessimistic and morose mental condition, the enlargement of the spleen and lymph glands, and the pruritus. He compared the disease with general paresis both in its clinical and pathologic manifestations. In his historical sketch of the disease he pointed out that it had been imported into the United States many times in the days of slavery, but had never spread. In discussing the relation to trypanosomes he took a conservative stand, and suggested that though there was in all probability an etiologic relationship further research was necessary.

The lecturer then described a closely allied form of infection, kala-azar, or as he preferred to call it, tropical febrile splenomegaly. This also is a chronic febrile disease characterized by fever of a variable type, anemia, prostration, and emaciation; the liver and spleen are always enlarged, sometimes very markedly. The disease seems to be almost invariably fatal. So far this disease has not been described in the western hemisphere, but is limited to Africa, India, and China. In Assam it has in recent years almost decimated the population in some districts. The recent discovery of the parasite by Leishman was interestingly described, and its oval form, macronucleus and micronucleus, and grouping into masses were pictured. Its close relation to the trypanosomes, and the demonstration of this by the cultural work of Rogers was mentioned. Attention was also called to the valuable work of Wright of Boston in connection with oriental sore, in which it was shown that this condition is associated with what is morphologically an identical parasite. Dr. Manson suggested that in tropical febrile splenomegaly the parasites leave the body by means of surface sores or intestinal ulcerations. He pointed out the difficulty of explaining the fact that tropical febrile splenomegaly, a very fatal disease, and oriental sore, a non-fatal disease, are associated with what appears to be the same parasite. He cited a belief that oriental sore occurred only in countries where camels are found, and suggested that it might be due to the action of the parasite modified by passage through the camel, while tropical febrile splenomegaly might be due to the same parasite unmodified. This supposition would assume an analogy to smallpox and vaccinia which are due to the same germ.

modified in the case of vaccinia, by its passage through the cow. He showed that the life history of this parasite outside of the body is only imperfectly known, though it seems probable that a fly of some sort acts as an intermediate host.

Several lectures were then devoted to the discussion of the diagnosis of malaria, and the several tropical diseases which are commonly confused with it. In the diagnosis of malaria the lecturer emphasized three points; the periodicity of the paroxysms, the blood examination, and the therapeutic test. Mediterranean fever, liver abscess, relapsing fever, tropical febrile splenomegaly, and leprosy were all mentioned as tropical diseases likely to be mistaken for, and treated as malaria. The differential diagnosis of these different conditions was fully discussed, and several points of importance were brought out. In connection with Mediterranean fever Dr. Manson emphasized the lack of value of the serum test under ordinary circumstances. He pointed out that the condition of the culture of *Micrococcus melitensis* was of great importance, as was the personal equation of the observer. In the remarks on liver abscess stress was laid on the insidious character of the symptoms. In discussing this point the lecturer brought forward two aphorisms which he had formulated as a result of his experience in China, where he observed a great deal of liver abscess and thoracic aneurism. These were, to suspect thoracic aneurism in all obscure non-febrile thoracic complaints, and to suspect liver abscess in all obscure febrile abdominal conditions. In diagnosis of liver abscess the necessity of repeated exploratory needle punctures was emphasized, and it was advised that such punctures be always done under an anesthetic, and that when the abscess was found the needle should be left *in situ*, and operation proceeded with immediately.

In the ninth lecture Sir Patrick Manson briefly considered the treatment of the diseases he had previously discussed, and also that of dysentery and sprue. As a prophylactic measure he advised cautioning all patients leaving the tropics that they should continue precautionary measures against tropical diseases for at least six months after their departure. In considering dysentery physicians were advised to regard it as, in a sense, a surgical condition, and to look on the intestinal canal as a large drainage tube. The principles of treatment included the removal of the discharges from the ulcers, and the use of agents having a direct effect on the specific causes of the disease. The treatment advocated consisted in absolute rest, the reduction of food to a minimum for a time, mild catharsis, preferably with small doses of castor oil, and the internal administration of ipecac. The latter drug Dr. Manson regards as almost specific, and thinks it has fallen into disrepute, especially in the United States, on account of its improper use. In the treatment of sprue, which the lecturer regarded as a very dangerous disease if improperly treated, absolute rest, a restricted diet of milk, and in some cases strawberries was recommended. In some cases scraped meat was allowed. The rest and the restriction of the diet until at least six weeks after the stools became normal was insisted on.

In the final lecture some of the unsolved problems in tropical medicine were considered. In connection with yellow fever Dr. Manson suggested two lines of research. He stated that the relative immunity of the old inhabitants in yellow fever districts was very often not due to previous attack, and that the reason for this immunity was yet to be solved. He suggested that there might be two strains of yellow fever virus, an attenuated and a virulent one, just as in the case of smallpox and vaccinia. One line of work suggested was the determination of the clinical picture presented by the inhabitants of a yellow fever district while going through this immunizing stage. Another problem suggested was the study of the effects on the malarial parasite and other insect-carried germs of passing them through different species of mosquitoes. In connection with yellow fever, the danger that this disease might be conveyed to the tropical portions of Asia by the opening of the Panama Canal was discussed, and it was pointed out that the United States would have to face the problem of the prevention of this spread. Dr. Manson suggested that this could be done without serious inconvenience to human beings, as the war must be waged on the stegomyia mosquito. Other problems to be studied related to the peculiar distribution of such diseases as malaria and filariasis. With equally infected territory so far as mosquitoes were concerned, and with equal chances of contamination of these, similar districts were often very differently infected.

The final lecture was closed by a plea for the teaching of tropical medicine as a special study for those whose work was likely to take them to the tropics. San Francisco was considered by the lecturer to be the most favorably situated city in the United States for the establishment of a school of tropical medicine, and this was suggested. Education of school children in tropical districts and of government employes was also insisted on, and especial stress was laid on the necessity for education regarding the rôle which insects play in the transmission of tropical diseases.

Weak Heart Sounds.—Hoffman says (American Year Book of Medicine): If the aortic second sound becomes very weak, and the second pulmonary sound likewise, in infectious diseases, it indicates great weakness of the heart, and is, therefore, a bad sign. Marked weakness of the second pulmonary sound in mitral valvular disease indicates imperfect compensation. Marked weakness of the sounds at the base, as compared with those at the apex, indicates an alcoholic heart. Marked weakness of the sounds at the apex, as compared with those at the base, show a fatty heart.—*Denver Med. Times.*

Therapeutics

[It is the aim of this department to aid the general practitioner by giving practical prescriptions and, in brief, methods of treatment for the diseases seen especially in every-day practice. Proper inquiries concerning general formulae and outlines of treatment are answered in these columns.]

Pneumonia.

Ewart, in *London Lancet*, recommends for the shock of invasion of pneumonia, recumbency, warmth and a small dose of ether or brandy with hot water. In addition a small dose of ammonium bromid with the aromatic spirits of ammonia and from 5 to 10 drops (.30-.65) of a solution of morphin (1 per cent.) in aqua chloroformi to prepare the patient for sleep is advisable. An initial dose of calomel is also recommended, followed by a senna draught.

The author states, in relation to cardiac treatment, that arrangements must be made for the administration of oxygen to be commenced early and given continuously, as a valuable aid to the heart against fatigue, and not postpone its administration until the desperate state is reached. It has the advantage over the continuous administration of alcohol in being harmless and in not affecting the alimentary tract. The glass funnel should be avoided in the administration of oxygen as very unsuitable. The best means is to place the end of the tube between the lips or immediately in front of the mouth. He recommends leeches applied early to the seat of pain, and makes this a part of the treatment regularly. He also recommends the early application before the deposition of fibrin has taken place and not their application during the stage of exhaustion.

Sweating may be promoted by the hot-air bath to the lower extremities or a hot mustard footbath, but the patient must not be fatigued by these measures.

As to the medicinal treatment, the chief aims are to promote diaphoresis, diuresis, fibrinosis and absorption. To meet these indications the author recommends a combination of ammonium citrate and sweet spirits of nitre together with warm beverages. To improve the cardiac condition he recommends gin as superior to alcohol in some respects, as it is a better diuretic. Oxygen, as has been stated, is recommended early in the disease, and sound sleep as peerless in keeping up the heart's strength.

In order to check the tendency to coagulation, citric acid is recommended as a precipitant of calcium, which aids clotting. The carbonates and iodids act similarly, but the carbonates

should be avoided in pneumonia because of the gastric inflation produced, which is indirectly very detrimental to the heart's action. The iodids, however, are highly recommended in the treatment of this disease, as diminishing the tendency to coagulation and, on the other hand, increasing absorption of the fibrinous deposits. He recommends it in doses of 60 grains (4.00) a day, or more, if necessary. A combination similar to the following is recommended:

℞.	Potass. iodidi	gr. v	30
	Liq. ammon. cit	ʒii 8	
	Spts. etheris nitrosi	ʒss 2	
	Spts. ammon. arom	m. xx	1 30
	Aquæ chloroformi q. s. ad	ʒss 15	

M. Sig.: One tablespoonful diluted, to be taken every hour for six doses, then every three hours.

Colchicum in Gout.

The following combinations by Beasley containing colchicum are recommended in the treatment of gout:

℞.	Ext. colchici		
	Ext. rhei		
	Ext. aloes soc., āā	gr. xxx	2
	Ext. belladonnæ	gr. v	30

M. Ft. pil. No. xxx. Sig.: One pill twice a day. Or:

℞.	Pulv. colchici sem	gr. lxxii	4 75
	Sodii salicylatis		
	Magnesiæ (calcined), āā	ʒii	8

M. Ft. cachet No. xxiv. Sig.: One every four hours. Or:

℞.	Colchicinæ salicylatis	gr. ss	03
	Methyl salicylatis	ʒiiss	10
	Ol. menth. pip	m. xxx	2

M. Ft. cap. No. xxx. Sig.: One capsule three times a day. Or:

℞.	Tinct. colchici	ʒiss	6
	Tinct. cimicif.	ʒi	4
	Tinct. bellad.	ʒss	2
	Sodii bicarb.	ʒiii	12
	Inf. gent. co. q. s. ad	ʒvi	180

M. Sig.: Shake the bottle and take one tablespoonful in water every four hours. Or:

℞.	Tinct. colchici	ʒiii	12
	Tinct. bellad.	ʒi	4
	Lithii citratis	ʒii	8
	Elix. simplicis q. s. ad	ʒiii	90

M. Sig.: One teaspoonful after meals, in water.

In cases of gouty rheumatism the following combinations are recomemnded:

℞.	Vini colchici	ʒi	4
	Magnes. sulph.		
	Potass. bicarb., āā	ʒiv	15
	Sodii salicyl.	ʒiss	6
	Aquæ chloroformi q. s. ad	ʒiv	120

M. Sig.: One tablespoonful with a teaspoonful of lemon juice, while effervescing, three times a day. Or:

℞.	Colchicinæ salicyl	gr. ss	03
	Acidi salicylici	ʒiss	6

M. Ft. pil. No. xxx. Sig.: One pill every four hours during the day.

Prophylaxis of the Diarrheal Diseases of Childhood.

Dr. Seneca Egbert, in *Med. Bull.*, states, for an efficient prophylaxis of the diarrheas of children, that both the predisposing and exciting causes must be considered. Among the former heat is a most powerful factor. Everything possible should be done to keep the babies cool; the clothing should be reduced to a minimum consistent with safety, keeping in mind the possibility of sudden changes in temperature and the dangers which may arise therefrom in the way of deranging the intestinal functions.

Living and sleeping rooms should be kept as cool and as well ventilated as possible. The fear of "night air" should be removed from the minds of the patients. The country or seashore is much preferable during the heated term to the city. If necessary to keep the body temperature down, the bath should be resorted to frequently—twice or three times a day, if necessary—and the baby should be given plenty of clean, sterile and cool water to drink. Milk is the most important article of diet during the first year or so of the infant's life and up to the first quinquenium. It should be pure and not over forty-eight hours old, and should be sterilized or pasteurized soon after taken from the cow. Cleanliness to the extreme should be observed with everything about the child. Napkins and soiled clothing should be promptly boiled or sterilized, as most of the diarrheal discharges are probably infectious.

The importance of excluding house flies and other insects from access to the infants not only to prevent any disturbance of their sleep, but to prevent the carrying of infection from fecal discharges and transmitting germs of the most harmful character.

Laryngeal Manifestations of Influenza.

E. J. Moure, in the Pract. Med. Series of "Year Books," states that the laryngeal manifestations of influenza are found under four forms: 1, The catarrhal form; 2, the infiltrated edematous form; 3, the ulcerative form, and 4, the myopathic form. As local treatment the author recommends an inhalation from a pint of hot water containing a teaspoonful of the following:

℞.	Menthol	gr. x	65
	Balsami peruviani	ʒss 2	
	Thymol	gr. i	06
	Tinct. eucalypti q. s. ad	ʒii 60	

M. Sig.: One teaspoonful floated on a pint of hot water as an inhalation.

Hot fomentations around the neck are very useful in the painful congestive forms.

Scarifications may be necessary in the markedly edematous forms, but usually the following combination as a spray will give relief:

℞.	Cocainæ muriatis	gr. ii-iiiss	12-.20
	Sol. adrenalin (1-1,000)	m. xl 2	65
	Antipyrin	ʒi 4	
	Glycerini		
	Aq. menth. pip., āā	ʒvi 24	
	Aquæ q. s. ad	ʒvi 180	

M. Sig.: To be used as a spray three or four times a day.

Later in the course of the trouble, when the infiltration has disappeared, good results are obtained, according to the author, from the application of a silver nitrate solution or zinc chlorid 1/100 or 1/50, or it may be as strong as 1/30.

In cases of edema of the glottis in such conditions, or from the various other causes, J. C. Gittings states that intubation rarely affords relief unless the obstruction is infraglottic. Tracheotomy is demanded in extreme cases. The continuous inhalation of medicated steam is always to be employed; scarification and external depletion by leeches is recommended. Cold and heat should be used externally and internally—cold as a prophylactic and heat as a stimulant and absorbent. Stimulating and supportive treatment is necessary in such cases.

Medicolegal

Compulsory Physical Examination.

The Supreme Court of Montana says, in May vs. Northern Pacific Railway Co., that on the question of whether, in an action for personal injuries, a court may compel the plaintiff to submit to a physical examination by physicians and surgeons appointed by the court, the authorities are in hopeless conflict, and any attempt to reconcile them would be barren of results. The first reported case in which the power of the court to compel such examination is asserted is Walsh vs. Sayre, 52 How. Prac. 334, decided by the New York Superior Court in 1868. This was an action for damages for malpractice, and on the analogy to cases of mayhem, divorce on the ground of impotency, and cases of controversies between a widow claiming to be pregnant by the decedent, and other heirs of the estate, wherein such examinations had been ordered, it was held that a court of law could compel the plaintiff to submit to a physical examination. A leading case on the subject is Schroeder vs. Railway Co., 47 Iowa, 375, decided in 1877. Mention is not made of the New York case cited above. The opinion states that there were no precedents at the time of its rendition. The power of the trial court to compel the plaintiff to submit to such an examination is asserted.

After continuing the review showing the decisions of courts

on the first presentation of this question to them, the Supreme Court of Montana says that the case of Walsh vs. Sayre was followed in Shaw vs. Van Rensselaer, 60 How. Prac., 143; but in 1891 the question came before the Court of Appeals of New York in McQuigan vs. Railway Co., 129 N. Y., 50, and Walsh vs. Sayre and Shaw vs. Van Rensselaer were overruled. The McQuigan case was followed in Cole vs. Fall Brook Coal Co., 159 N. Y., 59, decided in 1899. The Legislature of New York, however, circumvented the effect of these last decisions by enacting a statute directly conferring upon trial courts the power to make and enforce such an order. Then follows a further review of decisions, and the statement that if the last announcements of these several courts may be taken to indicate the law in their respective states, a review of the decisions discloses that the power of trial courts to compel such examinations is asserted in Alabama, Arkansas, Georgia, Iowa, Indiana, Kansas, Kentucky, Michigan, Minnesota, Missouri, North Dakota, Washington and Wisconsin, and denied in the federal courts, and in Illinois, Massachusetts and Texas, and was denied in New York until specifically granted by direct legislative enactment.

The bare assertion that trial courts possess this power, in the absence of any legislation, and without common law precedents, has led to the greatest possible confusion among the decisions of the very courts asserting it. (1) What is the source of the power? (2) To what extent may it be carried? (3) May the defendant demand the order as a matter of right? And (4) how will the court enforce obedience to its order?

1. Singularly enough, the first of these questions appears to have received little or no consideration. In some of the opinions it is said that the power is one inherent in the trial courts. In Graves vs. Battle Creek, 95 Mich. 266, decided in 1893, it is said, "It is true that the rule is one of modern growth." Most of the courts content themselves with the bare assertion of the power, without any discussion of its origin.

2. If the plaintiff may be compelled to submit to a physical examination, is the authority to order it an absolute or only a qualified one? May the plaintiff be compelled to submit to the administration to him of anesthetics or drugs by which he loses consciousness altogether, or, if the injury is an internal one, may he be compelled to submit to the use of such surgical instruments as the physicians appointed to make the examination may see fit to use? May he be compelled to exhibit the injury to the jury in open court, and, if the plaintiff be a woman, is there any protection whatever against violence to her feelings? By some of these courts it has been held that anesthetics and drugs should not be used (Schroeder vs. Railway Co., Strudgeon vs. Sand Beach, 107 Mich., 496), and that the plaintiff should not be compelled to submit to the use of surgical instruments (O'Brien vs. La Crosse, 99 Wis., 421); but in Railway Co. vs. Palmore, 68 Kan., 545, it was held that the plaintiff could be compelled to submit to the examination, and to an injection of a drug into his injured eye to dilate the pupil; and in Hall vs. Manson, 99 Iowa, 698, it was held that the plaintiff, a woman, could be compelled to remove her shoe and stocking, that an examination might be had and measurements taken of her injured ankle in the presence of the jury. In Railway Co. vs. Hill, 8 South., 90, the Supreme Court of Alabama said: "When it becomes a question of possible violence to the refined and delicate feelings of the plaintiff on the one hand, and possible injustice on the other, the law can not hesitate. Justice must be done." This is quoted with approval in Lane vs. Railway Co., 21 Wash., 119. However, in Graves vs. Battle Creek, it is said: "The decisions are not uniform on this question, but the great weight of authority is in favor of the exercise of such power by the court under proper restrictions; the rule recognizing, however, that a wide discretion is vested in the trial court, which justifies a refusal to require the examination . . . where the sense of delicacy of the plaintiff may be offended by the exhibition." To the same effect is the decision in Ottawa vs. Gilliland, 63 Kan., 165.

3. In Sibley vs. Smith, 46 Ark., 275, and in Railroad Co. vs. Thul, 29 Kan., 466, it is held that the defendant may demand the order as a matter of right, but that in granting it the court may exercise its discretion. This court (the Supreme Court of Montana) is unable to understand this contradiction of terms, and observes that in most of the cases it is held that the application is one addressed to the sound discretion of the trial court, subject to review for manifest abuse only.

4. In the Schroeder Case and in Sibley vs. Smith it is said that refusal of the plaintiff to comply with the order would constitute contempt of court, and subject the plaintiff to the punishment of a recusant witness; while in Turnpike Co. vs. Baily, 37 Ohio St., 104; Lane vs. Railway Co., Wanek vs. Winona, 78 Minn., 98; Brown vs. Railroad Co., 12 N. D., 61, and in the dissenting opinion in Railroad Co. vs. Botsford, 141 U. S., 250, it is said that it is not a question of contempt; that the court can not compel the plaintiff to comply with the order which it has made, but, if he refuses, the court may dismiss his action or refuse to permit him to testify.

From the assertion of the power arising from the apparent necessities of extraordinary cases, as disclosed by the decision in the Schroeder Case, we observe the almost limitless extent to which the power has been carried; and, not content with applying the rule to civil actions for personal injuries, it has been extended to apply to the prosecuting witness in a criminal case (King vs. State, 100 Ala., 85), and, for the same reasons advanced for the exercise of the power in civil action by the courts asserting its existence, the doctrine has been applied to a criminal case, and the defendant compelled to bare to the view of the jury part of the unexposed portions of his body on which were certain tattoo marks, in order to enable the state to complete the case against him, with the result that the defendant was convicted of a capital offense. State vs. Ah Chuey, 14 Nev., 79.

The only instances in which such power was invoked at common law were in actions for divorce upon the ground of impotency, appeals of mayhem, cases of atrocious battery, cases of conviction of a woman of a capital crime who is alleged to be pregnant, and controversies between heirs and a widow claiming to be pregnant by the deceased. No one of these rules has ever obtained in this country, unless it has been in cases of divorce on the ground of impotency. The power was exercised by the English ecclesiastical courts, and was a graft from the civil law.

The reasons advanced by the courts for the exercise of this power, in the absence of any direct authority, the Supreme Court of Montana goes on to say, do not commend themselves to it. It says that it is said by some that the power is analogous to the proceeding for discovery; but discovery was not compelled by the law courts at common law. By other courts it is said that the assertion of this power is necessary to prevent the plaintiff from maligning and bolstering up a fictitious case "by the very unreliable speculations of so-called medical experts." Wanek vs. Winona, above cited. It is a curious process of reasoning which enables a court to characterize the solemn testimony of medical men as unreliable speculations when the witnesses are called by the plaintiff, but if these same physicians be called by the court, on application of the defendant, they immediately become the instrumentalities through which, not approximate, but exact, justice is to be done. Others, including the dissenting opinion in the Botsford Case, say it is strange that the plaintiff may, if he chooses, exhibit his injury to the jury, or may testify concerning it, or may have other witnesses do so, but he can not be compelled to make such exhibition. This court is of the opinion that even if the plaintiff might, as a matter of right, exhibit his injuries to the jury, it would not add to the argument in behalf of that view of the case. In this state (Montana), however, he does not possess that right. He may offer to do so, but it is within the discretion of the court to permit or refuse the offer, subject, of course, to review for a manifest abuse of that discretion.

The right to the inviolability of one's person is merely a privilege which the plaintiff may waive, as a defendant may the constitutional guaranty that in a criminal case he can not be compelled to be a witness against himself. As a defendant may give evidence against himself, but can not be compelled to do so unless he waives the privilege, so the plaintiff may

exhibit portions of the clothed parts of his body to the jury, if the court permits, but can not be compelled to do so. The constitutional guaranty is not more solemn and binding in one instance than in the other. And, for the much stronger reason, the plaintiff can not be compelled to make such exhibition of himself to third parties, strangers to the case, in order that they may procure material for testimony.

Current Medical Literature

AMERICAN.

American Medicine, Philadelphia.

August 19.

1 *Matas Operation for the Cure of Aneurism. J. H. Gibbon, Philadelphia.
2 *Treatment of Chancre and Chancroid. D. E. Wheeler, Buffalo.
3 Elimination of Endogenous Uric Acid in a Case of Chronic Gout. A. T. Laird, Albany, N. Y.
4 *Antituberculosis Work in the United States Army, Navy and Marine-Hospital Services. G. H. Kress, Los Angeles.
5 *Treatment of Infected Otitis Media. J. G. Huizinga, Grand Rapids, Mich.
6 *Enterotoxismus as a Substitute for Autointoxication. H. A. Houghton, New York.

1. **Matas Operation for Cure of Aneurism.**—Gibbon describes the operation and reports one case, that of a negro aged 31, who suffered from a large popliteal aneurism. The sac was laid open and the arterial openings sutured. The sac was then obliterated by repeated rows of plicating sutures. The wound was closed without drainage. Suppuration took place, but the patient made a complete recovery after superficial drainage was established. Some months after the operation there was no evidence of a recurrence.

2. **Treatment of Chancre and Chancroid.**—Wheeler classifies venereal ulcer into: 1. Simple uncomplicated ulcer, treatment consisting of frequent irrigation and wet dressings. 2. Ulcer complicated by phimosis. If attempts at reducing the phimosis fail, lateral incisions and secondary circumcision should be done; primary circumcision is contraindicated. 3. Ulcer complicated by paraphimosis. If seen early, immediate reduction is imperative; if not seen until sloughing has relieved the strangulation, expectant treatment should be instituted. 4. Phagadenic ulcer. Irrigation should be done every two hours, day and night, and iodoform used. Escharotics are positively contraindicated.

4. **Antituberculosis Work in U. S. Army, Navy and Marine-Hospital Service.**—Kress discusses the antituberculosis work carried on by the medical branches of the three public services. According to the 1900 census the mortality rate from tuberculosis for the registration area of the United States was 187.3 per 10,000 population. In the army, with a total strength of 67,643 in 1904, the mortality rate was 37 per 100,000 whites; 314 per 100,000 negroes; 84 per 100,000 Filipinos; for soldiers of the three races together it was 53 per 100,000—for all races being hardly more than one-fourth as great as in civil life. In the navy, with a total strength of 37,248, there was an increase in 1904 of 104 cases over the figures of 1903. The Marine-Hospital Service cared for 933 tuberculous seamen in hospitals and treated 306 in dispensaries.

5. **Treatment of Chronic Suppurative Otitis Media.**—Huizinga says that this condition can not be cured unless the entire auditory tract can be made surgically clean by forcing the antiseptic fluids through from end to end of the entire tract. It is necessary to have a large opening in the drum and a thoroughly dilated condition of the Eustachian tube, both for the purpose of drainage and of efficient cleansing. It is important to have a continuous current of antiseptic vapor passed through a Eustachian catheter into the Eustachian tube, both for cleansing and dilating purposes. This is best accomplished by connecting a vaporizer containing iodin, menthol and creosote in oil, with a large air tank, having the air compressed up to thirty pounds. The valves are opened and a continuous current of antiseptic air is forced through the catheter and into the Eustachian tube until the pressure goes down to twenty pounds; this requires several minutes. By this method thorough and complete dilation and the cleansing and disinfection from the use of the antiseptic solution are accomplished and the danger of driving infected material that may be present in the Eustachian tube into the deeper parts of the middle ear is avoided. It is necessary to treat the parts sufficiently often to maintain as nearly as possible a condition of antisepsis. No treatment can be considered thorough that does not recognize the relation existing between pathologic conditions in the nose and nasopharynx and the ear.

6. **Enterotoxismus.**—Because the word autointoxication as now used has many different meanings leading to considerable confusion and inaccuracy, Houghton suggests that the autointoxication of enteric origin be designated as enterotoxismus, and gives the following definition: A morbid condition characterized by the absorption of substances from the gastrointestinal tract which are toxic by virtue of their quantity or quality and which are produced therein by the disintegration of foodstuffs through the perverted and prolonged action of enzymes or the activity of entophytes. Classifications are given.

Medical Record, New York.

August 19.

7 *Operations for Procidentia Uteri. W. M. Polk, New York.
8 *Study of the Blood in Relation to Therapeutics. E. Castelli, New York.
9 *Practical Points in Pedriatrics for the General Practitioner. T. W. Kilmer, New York.
10 *Deaf-Mutism and Ptomain Poisoning. W. S. Bryant, New York.
11 Further Notes on the Toxemia of Pregnancy. W. S. Stone, New York.
12 Henry G. Davis, M.D. A Review of Some of His Work. J. J. Nutt, New York.
13 *Method for the Sterilization of Sea-Tangle Tents. O. L. Mulot, Brooklyn, N. Y.

7. **Operations for Procidentia Uteri.**—Polk proposes two methods of dealing with this condition. The first is applicable to partial prolapse when retention of the uterus is desired, and has as its purpose the reduction in size and weight of the uterus, and its removal from the posterior and lower parts of the pelvic cavity to the more advantageous position in the anterior and upper parts of this region. This is accomplished by high amputation of the cervix, followed by Alexander's operation and perineal repair. The second procedure is applicable to complete prolapse, and consists in removal of the uterus, and attachment of the vaginal stump to the anterior abdominal wall. The details of this operation are described and illustrated. The author has performed it in 10 cases with excellent results. Perineal repair is essential in this instance also, but the method chosen must not shorten the vagina too much, or there will not be slack enough left to permit the stump to reach the abdominal wall when the laparotomy is done. Vaginal hysterectomy is considered too radical for partial prolapse, and not sufficiently so for complete, and the plan of reefing the uterosacral ligaments is also deprecated.

8. **Blood in Relation to Therapeutics.**—Castelli expresses the view that the "future of medicine belongs to hematology," and that hypodermic and intravenous medication must finally replace internal treatment. The blood and lymph, he states, are the bearers and transmitters of any infectious element, and the localization of the infectious element in a special organ or region of the body, is a simple process of metastasis. The microbes, or toxins, are transported by the blood vesse's into such regions of the body as offer conditions most suitable for the accomplishment of their reactive processes, just as in a similar manner cancer cells are transported to those parts of the body wherein may be reproduced the malignant growths from which they themselves originated. If the therapeutic agent should follow the same route as that followed by the infective element, its action, general and local, would take effect at such points as presented a necessity for its action.

9. **Practical Points in Pediatrics.**—In dealing with children it is essential, says Kilmer, to gain their respect, confidence and obedience, and to do this tact is required. Children should not be deceived by being told that something is not going to hurt them when it is, for in this way their confidence is irremediably lost. In examining an infant or young child it should always be undressed, and if asleep, it should be studied a while before being roused. A child's chest can not be aus-

cultated without the use of a stethoscope, because the average adult ear would cover almost an entire lung of an infant. Sputum is obtained from babies by introducing a catheter, 21 F., into the esophagus, as the act of gagging forces the sputum which is in the esophagus into or on the catheter. The landmarks on an infant's chest are quite different from those of an adult's, and it is impossible to locate the apex beat without the use of the stethoscope. The throat and ears should always be examined when called to a sick baby. Adenoids should never be operated on without an anesthetic, for the nervous shock more than counterbalances the risk of the anesthetic. A simple and practical system of milk modification that can easily be remembered is described, and a blank report is reproduced on which the mother is supposed to record the infant's progress.

10. **Deaf-Mutism and Ptomain Poisoning.**—Bryant describes two cases in which difficulty in walking, deafness, and disorders of speech were apparently produced by food poisoning.

13. **Sterilization of Sea Tangle Tents.**—Mulot advises soaking sea tangle tents for seventy-two hours in tincture of iodin and then immersing them in 95 per cent. alcohol, to remove the surplus iodin. Another method is to boil the tents and then dry them in sterile tubes for a few days in an oven or hot-air chamber, which will cause them to shrink to their original size. Or the two methods may be combined, first boiling and shrinking them, and then soaking in iodin. These tents furnish the most desirable means of dilating the cervix in some cases, and when prepared in this way their use is free from danger.

Medical News, New York.

August 19.

14 Sphygmograms from Two Cases of Bradycardia. G. Dock, Ann Arbor, Mich.
15 *Impossibility of Differentiating So-Called Paratyphoid from Typhoid Except by Bacteriologic Examination of the Blood. W. Coleman, New York.
16 *Experiments with Radium Emanations. W. C. Phillips, New York.
17 Suprapubic Prostatectomy. A. I. McKinnon, Lincoln, Neb.
18 *Prevention and Treatment of Puerperal Sepsis. L. C. Fischer, Atlanta, Ga.
19 Plea for Surgical Intervention in Suspected Malignant Disease of the Abdominal Cavity. B. B. Davis, Omaha, Neb.
20 Insane of Canada: Presidential Address. T. J. W. Burgess, Montreal, Canada.

15. **Difficulty of Differentiating Paratyphoid from Typhoid.**—According to Coleman, paratyphoid infections can not be distinguished from typhoid, except by the recovery from the blood of the bacillus concerned and its proper identification. He considers the term paratyphoid not only unnecessary but misleading, and suggests the advisability of considering typhoid clinically as a disease which may be caused by several members of the typhoid-colon group of bacilli.

16. **Radium Emanations.**—Phillips carried out some therapeutic experiments on seven patients with diseases of the ear, nose and throat with a properly constructed tube, the interior of which was coated with radium so that the emanations could be made use of in treatment. The method was found to be useless.

18. **Treatment of Puerperal Sepsis.**—Fischer states that the woman should receive proper care and attention before the birth of the child and that her bed should be properly prepared. Especial care should be paid to the physician's hands. The placenta and membranes should be carefully examined. The perineum should be examined for tears, and if these have occurred they should be repaired at once. As soon as there is a rise of temperature treatment should be started. Fischer emphasizes the importance of making careful digital examinations and advocates the use of a dull irrigating curette when the temperature is not reduced by douches. He calls attention to the value of normal salt solution in diluting the toxins and in aiding absorption. He prefers tube to gauze drainage in these cases, and avoids the use of gauze after the curettement. He also states that it is important to open and to drain abscesses in the pelvis as soon as they form.

Boston Medical and Surgical Journal.

August 17.

21 Problems of Intermediary Metabolism. R. H. Chittenden, New Haven, Conn.
22 *Case of Lymphatic Leukemia in a Child. J. L. Morse and H. C. Low, Boston.
23 Further Contribution to the Study of Bacilluria in Typhoid and Its Treatment with Hexamethylenamin. C. D. Easton, Boston.

22. **Lymphatic Leukemia in a Child.**—Morse's case, in a girl 3½ years old, is of interest in that it afforded an opportunity to study the development of the changes in the blood and lymph nodes during a considerable period, and that, although it was most carefully studied, the correct diagnosis could not be made until a comparatively short time before death. It shows that the character of the changes in the blood may not develop to a degree sufficient to justify a positive diagnosis for many months. It also shows that the changes in the lymph nodes may be, not only at first, but even for a considerable time, materially different from those which are usually considered to be typical of this disease. It is noteworthy that the characteristic changes in the blood and lymph nodes appeared at essentially the same time. According to Morse, the only inference that can be made from the histologic study of the tissues at different stages of the disease is that lymphatic leukemia may have its origin in a malignant growth affecting the lymphoid tissues more or less generally, and that until there is a secondary proliferation of the lymphoid cells we do not get the typical tissue picture and blood condition which is characteristic of lymphatic leukemia. It suggests that leukemia, pseudoleukemia and malignant lymphoma can not be separated as three distinct entities, and that they do not always differ characteristically in the histologic structure of their lymphoid tissues; and that the microscopic sections in these cases often will be wrongly judged in the absence of complete clinical data as regards the distribution of the process and the examination of the blood.

New York Medical Journal.

August 19.

24 The Epiphyses of the Long Bones and Their Bearings on the Operation of Resection. J. Knott, Dublin, Ireland.
25 *Use and Abuse of the Stomach Tube. E. Palier, New York.
26 *Employment of Dry Cups in Herpes Zoster. M. Leale, New York.
27 Tropical Diseases of the Angola Highlands. F. C. Wellman, Benguella, West Africa.
28 Element of Truth in Mental Healing. L. Waite, Chicago.
29 Six Lectures on Diseases of the Blood. J. M. Swan, Philadelphia.
30 *New Method of Extracting the Internal Saphenous and Similar Veins in Varicose Conditions; Preliminary Report. W. L. Kellar, San Francisco.

25. **Use of Stomach Tube.**—Whenever possible Palier uses three vessels for obtaining the gastric contents for examination. The first few cubic centimeters he collects in one vessel; then enough for examination in a second vessel, and the remainder in a third vessel. The second vessel usually contains the fluid of the highest acidity. He seldom aspirates to obtain the gastric contents, but slips a rubber tube on the distal end of a short glass tube, the proximal end of which is inserted into a Ewald stomach tube, and by lowering the distal end the stomach contents come out by the siphon principle, especially when some pressure is used on the stomach. He believes that the stomach tube is not used sufficiently for diagnostic purposes, and cites several cases to show the utter impossibility of correctly diagnosticating and treating gastric diseases without the aid of this valuable instrument. The contraindications of introducing the stomach tube are really very few. When it is carefully and properly done, a soft rubber tube can do no harm. The classical contraindications are hematemesis, aneurism of the aorta and advanced pregnancy. Cardiac affections differ so widely in numerous respects that each case must be judged on its individual merits. In hemorrhage from the stomach, this instrument may do harm by aggravating the bleeding. In pregnancy each case should be judged on its own merits. As to aortic aneurism, while the introduction of a soft rubber tube is not likely to rupture the aneurism, yet this is liable to rupture any moment under excitement, and it is best, therefore, not to attempt the use of the tube. When the stomach can not empty itself, when there is alimentary stasis, when drainage is necessary, and when there is much mucus in the stomach, the stomach tube should be used.

26. **Dry Cups in Herpes Zoster.**—Leale emphasizes the fact that the careful and scientific application of dry cups has proved of great value in his hands in the treatment of herpes zoster, both in shortening the duration of the disease and in

ameliorating the symptoms. The dry cup should be applied over the ganglia of the posterior roots and over the points of emergence of the nerves involved. This is done just to the affected side of the spinous processes of vertebræ over the area determined, several cups being applied and allowed to remain long enough to insure their maximum suction power. After the first set is removed they can be reapplied if deemed necessary. Then a few cups are applied to the location of the emergence and over the course of the nerve or nerves involved. In this we are guided by the seat of the pain and hyperesthesia and by the location of the eruption. Leale makes it a practice to cup early in the disease, in many cases before the eruption has appeared, when, of course, it is difficult or impossible to distinguish it from a simple neuralgia. He usually finds it best to repeat the cupping once every twenty-four hours, and preferably just before the patient settles down for his night's sleep. In this way a nocturnal paroxysm of pain can often be prevented, and a good night's rest secured, which otherwise would have been impossible.

30. **New Method of Extirpating Varicose Veins.**—The operation described by Kellar should be employed to extirpate such varicose veins as have few branches, without mutilating the patient by a continuous scar along the course of the vessel to be removed. The vessel is exposed by a short incision near the femoral opening of the fascia lata (if the internal saphenous), is dissected free from its sheath for about one inch, and is then ligated as high up as possible. The lower end of the vein is exposed and treated in a similar manner. The vein is now cut below the proximal end and above the distal end, thus leaving the section to be removed free and ready for removal. The upper end of the section to be removed is split for about three-quarters of an inch on its anterior wall. A strong ligature is then tied to the upper end of the vein, care being taken not to include more tissue in the ligature than will pass through the lumen of the vessel. A wire loop or probe is then passed through the lumen of the vessel from the lower opening, and the ligature is threaded through the eye of the loop or probe, the probe is withdrawn and the ligature brought out on the surface at the point where the probe entered. Gentle traction is now made on the ligature, the edges of the vein being inverted into its own lumen by an assistant. Traction is continued until the vein is completely extirpated by being turned inside out and withdrawn from its sheath. When the internal saphenous vein is being removed a slight puckering is seen about midway between the incisions, indicating that the posterior branch of the vessel has been reached, and the latter, with another small branch often present at that point, can be ligated and incised through a small incision. After separating these branches, traction is again employed and the remainder of the vein removed. In the first patient operated on by the author only about three inches of the vein were removed, but in the second five inches were extirpated without difficulty.

Lancet-Clinic, Cincinnati.

August 19.

31 *Maternal Diet with the Object of Lessening the Bony Development of the Fetus. W. Gillespie, Cincinnati.
32 *President's Address, Mississippi Valley Medical Association. E. Walker, Evansville, Ind.
33 *Prevention of Heart Disease. R. H. Babcock, Chicago.

31. **Maternal Diet and Fetal Development.**—Gillespie discusses the possibility of influencing the bony growth of the fetus by regulating the diet of the mother. He believes that this is not only impossible but dangerous, inasmuch as the demands of the fetus must be met by the mother even to the extreme of decalcifying her own osseous system. Furthermore, even if it were possible to bring about such a result, it would probably increase the difficulties of labor rather than diminish them, because the lack of any bony development may prove a serious obstacle to labor. Under normal conditions the spinal column of the fetus possesses sufficient rigidity to act as a good transmitter of force. Its rigidity is greatly increased by the splint-like action of the arms and legs, folded as they are on the anterior surface of the child. If we could, by diet, lessen the rigidity of the fetal skeleton, it would in like proportion lessen its ability to transmit force and the result is a difficult labor.

32.—See article in THE JOURNAL, Feb. 6, 1904, page 347.

33.—See abstract in THE JOURNAL, Oct. 24, 1903, page 1040.

Annals of Surgery, Philadelphia.

August.

34 *Final Results in the X-Ray Treatment of Cancer, Including Sarcoma. W. B. Coley, New York.
35 *Scopolamin-Morphin as an Adjuvant in the Administration of General Anesthesia. G. Seelig, St. Louis.
36 *Scopolamin-Morphin Anesthesia. E. Ries, Chicago.
37 Hypertrophic Pyloric Stenosis in the Infant. J. M. Robertson, Glasgow, Scotland.
38 Combined Volvulus and Hernia Through a Recent Mesenteric Slit. H. C. Curl, U. S. N.
39 *Cure of Femoral Hernia. W. B. De Garmo, New York.
40 Punctured Wounds of the Bladder. E. Evans, La Crosse, Wis., and H. A. Fowler, Washington, D. C.
41 Dislocation Forward of the Atlas, with Fracture of the Odontoid Process of the Axis. J. A. Kelly, New York.
42 *New Interdental Splint for Fractures of the Lower Jaw. R. Russ, San Francisco.
43 *Treatment of Fractures of the Femur in Infancy and Childhood. M. W. Ware, New York.
44 Fracture of the Carpal Scaphoid. L. W. Ely, New York.
45 Transmesenteric Hernia of the Appendix Vermiformis. A. C. Wood, Philadelphia.

34. **X-Ray Treatment of Cancer and Sarcoma.**—After having given the *x*-ray a very careful trial in 68 cases of sarcoma in almost every locality, Coley concludes that, while in certain rare cases, especially of sarcoma originating in the lymphatic glands, improvement may be very striking, going so far, in some cases, as to cause entire disappearance, there is almost always a speedy recurrence, either local or metastatic, and that the influence of the *x*-rays on sarcoma is rarely, if ever, curative. The *x*-ray exerts a powerful influence on cancer cells of all varieties, but most marked in cases of cutaneous cancer. In some cases, chiefly in superficial epithelioma, the entire tumor may disappear, probably by reason of fatty degeneration of the tumor cells with subsequent absorption. In a much smaller number of cases of deep-seated tumors, chiefly cancer of the breast and glandular sarcoma, the tumors have disappeared under prolonged *x*-ray treatment. In nearly every one of these cases, however, that has been carefully traced to final result, there has been a local or general return of the disease within from a few months to two years. In view of this practically constant tendency to early recurrence, furthermore, in the absence of any reported cases well beyond three years, the method should never be used except in inoperable cases, or as a prophylactic after operation, as a possible, though not yet proven, means of avoiding recurrence. The use of the *x*-ray as a preoperative measure in other than cutaneous cancer is contraindicated (1) because the agent has not yet been proven to be curative, (2) because of serious risks of an extension of the disease to inaccessible glands or to other regions by metastases during the period required for a trial of the *x*-ray.

35. **Scopolamin-Morphin Anesthesia.**—Seelig presents a series of 65 general anesthesia administrations, including abdominal and vaginal hysterectomies, operations for hernia, hemorrhoids, anal fistula, plastic operations, curettements, uterine fixations, appendicectomy, nephropexy, thyroidectomy, craniectomy, orchidectomy, etc. In every instance the patient received a hypodermic injection of scopolamin hydrobromate, grain 1/100, and morphin, grain 1/6, one-half hour before the administration of the geenral anesthetic. General anesthesia was induced by means of the ethyl chlorid-ether sequence administered through the Bennett inhaler, specially modified for this purpose. Seventy-seven per cent. of the patients did not vomit at all. One-third of the patients who did vomit vomited only once, and then only from two drams to one ounce of pure mucus. Nausea was never pronounced, except in two cases, and vomiting never occurred earlier than two hours after operation. Seeling expresses himself as thoroughly satisfied with the method.

36. **Id.**—Ries has used scopolamin morphin on 72 patients in 92 operations, with good result.

39. **Cure of Femoral Hernia.**—The cases reported by De Garmo were met with in operating in a series of 1,250 abdominal hernias. The 110 femoral hernias were in 99 patients, 83 females and 16 males. Eighty-eight patients had single and 11 had double femoral hernia. The ages of the patients ranged

between 8 and 81, the greatest number of these cases occurring between the ages of 30 and 40. In 28 patients strangulation existed at the time of the operation, and 82 patients were operated on for the cure of the hernia. Only one death occurred, that of a woman aged 70, who had a strangulated hernia and an intestinal perforation. The intestine was fastened in the wound and freely opened. The patient died of exhaustion twenty-four hours later. There was only one actual recurrence, eight months after operation, in a woman of 75. The technic of the operation employed by De Garmo is as follows: The incision should be between two and three inches long, parallel with and to the inner side of the femoral vessels. The upper angle of the wound should be well up over Poupart's ligament and extend down over the saphenous opening. When the skin and the superficial fascia are incised, usually the sac and its subperitoneal fat will come into the wound with the appearance of an encysted lipoma and, before separating the sac, it is best that this entire mass should be lifted out of its bed by thumb forceps and blunt dissection, so that its neck where it passes under Poupart's ligament shall be entirely free from its surrounding. By traction on the sac and its superimposed fat this neck may not only be freed, but it will be materially lengthened, so that when it is finally ligated and cut off it will retract within the abdominal cavity, leaving the femoral canal free of foreign tissue. This is absolutely essential to a subsequent permanent cure. The sac should be opened, and where the omentum is found adherent it should be carefully ligated, cut away, and its stump reduced to the abdominal cavity. Adherent intestine will rarely be found, but when it is the adhesions must either be broken up or, if too firm, the adherent part may be cut out of the sac and left attached to the bowel. When in doubt the latter method is by far the safer. Adherent omentum is frequently found and should be cut away after careful ligation. The sac having been entirely freed of its contents, is tied off as high as possible, while it is being forcibly drawn down by an assistant. Great care must be used to insure the perfect freedom of the neck of the sac from protruding bowel or omentum while the ligature is being placed. After tying with strong catgut (a double strand of No. 2 plain is preferred), pass the needle, which has been previously threaded with it, through the neck of the sac and tie again. This gives a double ligature anchored by perforation between the two, and prevents slipping off. When the sac is cut away the stump should be examined to be sure that no bleeding vessels remain, and not until then should the ends of the ligature be cut. When the ligature is cut the stump usually retracts within the abdomen. If this is prevented by connective tissue which has not been broken it should be carefully pushed back, leaving the femoral opening absolutely free. This opening is closed by good-sized kangaroo tendon threaded in a strong, blunt needle by pressing the end of the finger firmly into the femoral opening under Poupart's ligament, and passing the needle through the ligament on the finger-point. This perforation should be well toward the outer side of the canal and close to the femoral vein. The operator should assure himself, by pressure of the finger against the ramus of the pubes, that the vessels are out of the way, and pass the point of the needle fully down to the periosteum of the pubic bone, taking up all tissues over it. This constitutes the first stitch, but should not be tied until the others are in place. Others should then be placed in the same manner, every quarter of an inch apart, until near the spine of the pubes. Usually three or four will completely close the femoral opening. When tied down and the ends cut moderately close, the fascia should be closed in by plain catgut, to avoid a pocket in the tissues that otherwise may result, and the skin may then be closed by buried sutures of plain catgut. The wound is covered by collodion and a compress of sterilized gauze, held in place by a figure-of-eight bandage. In ten days the dressings are changed and a bandage for temporary support is applied. If healing has been complete, the patient is allowed to sit up on the tenth day and to leave the house on the fourteenth day after the operation. The bandage used after the first dressing consists of a pelvic belt, of three thicknesses of canton flannel, with a compress of gauze over the former site of the hernia, and a perineal strap to prevent its slipping up. This is to be worn for four weeks. No truss or other permanent support should be worn.

42. **New Interdental Splint.**—The splint devised by Russ is made of spring brass 3/64 of an inch in thickness. Each clamp consists of two parts, a chin-piece and a piece bent at right angles, making a long and a short arm. The chin-piece is wider at one end to prevent its slipping when incorporated into the plaster-of-Paris dressing. It is 8 cm. long and provided with a number of holes so that the plaster-of-Paris may sink into them, thus making the dressing more secure. The right-angled piece is 1 cm. wide, while the arms measure 7½ cm. and 5 cm. respectively. The end of the short arm is provided with a simple lock which fits into a corresponding lock in the chin-piece. Three or four holes should be bored into the long arm. When these two parts are locked they form a clamp which permits of easy adjustment. This adjustment is accomplished by means of a round head brass machine-screw 6 cm. in length and carrying a winged nut. This fits into holes in the long arm and the chin-piece at 1½ cm. distance from the short arm. After the clamp has been made, it should be heavily nickel plated. The clamp has been found to be applicable to thirty-five out of fifty adult jaws. For the other cases, a splint with a short arm of 5½ cm. answers. The splint is applied with the patient lying in the dorsal position on the operating table. The face is shaven clean and the fractures reduced. A thin layer of felt or layers of sheet wadding are then fitted neatly over the chin and under the jaw, extending as far back as the rami. Over this the plaster-of-Paris bandage is carefully folded, the operator rubbing the plaster well as he proceeds. The bandage is carried back on each side to the ramus, where the turns are held by an assistant or by a patient. When the jaw is well covered the splints are applied, the parts being held together by the screws and nuts. The long arms are placed directly over the molar and biscuspid teeth, extending as far back as the last molars and emerging at the corners of the mouth. The chin-pieces are pressed into the plaster. They should run along the body of the jaw. The apparatus being in position, a few more turns of the bandage are taken and the dressing completed by rubbing in dry plaster-of-Paris. Accurate coaptation is desired. When dry, the chin-pieces are detached from the interdental portions and the plaster-of-Paris dressing removed and trimmed to the desired shape. The dressing is then reapplied to the jaw. The interdental portions of the splints, together with some dental compound, such as is commonly used by dentists in taking impressions, are thrown into hot water. When sufficiently softened, the dental compound is applied along the under surface of the interdental arms, and these are quickly placed on the teeth, in the same position as in the first application, and pressed firmly down so that the splints rest on an even bed, the dental compound filling up the holes which have been bored into the long arms. The short arms are then locked to the chin-pieces, the screws reapplied, and the apparatus tightened by means of the winged nuts.

43. **Treatment of Fractures of Femur in Infants.**—A device is described by Ware which he has used with excellent results in forty cases up to the age of five years. The device consists of a right-angled isosceles triangle constructed of one strip of book-binder's pasteboard, the width of the triangle adapted to the width of the thigh. One length is obtained by measuring the trunk from the level of the lower angle of the scapula to the inguinal fold. The length of the other side of the right angle is the length of the thigh. The hypothenuse is always a few inches longer. The single strip of cardboard is then bent to the shape of the desired triangle and the overlapping edges secured by adhesive plaster. The triangle may be made more rigid by reinforcing it on all sides of this inner aspect with small pieces of cigar-box wood. The outer surfaces in contact with the trunk and thigh are to be padded with non-absorbent cotton. A muslin spica secures the triangle embracing the trunk and the thigh in a flexed position. Over the muslin bandage several turns of a dextrin bandage are placed, giving additional security to the splint. The leg is left to move freely.

American Journal of Orthopedic Surgery, Philadelphia.

July.

46 President's Address, American Orthopedic Association. E. G. Brackett, Boston.
47 Coxa Vara Adolescentium and Osteoarthritis Deformans Coxæ. A. H. Freiberg, Cincinnati.
48 *Study of Thirty Cases of Chronic Non-Tuberculous Joint Disease Occurring in Adults, with Special Reference to Some of Doubtful Identity. H. W. Jones, St. Louis.
49 *Operative Treatment of Bone Tuberculosis. C. F. Painter, Boston.
50 Limitations of Erasions in Coxalgia. R. T. Taylor, Baltimore.
51 *X-Ray as an Auxiliary Treatment in Bone Tuberculosis. F. S. Peckham, Providence, R. I.
52 Skiagraphic Revelations in Rachitic Deformities of the Legs. W. Blanchard, Chicago.
53 Congenital Absence of Tibia: Transplantation of Head of Fibula; Arthrodesis at the Ankle Joint. T. H. Meyers, New York.
54 Practical Importance of Correct Foot Postures. H. L. Taylor, New York.

48. **Chronic Nontuberculous Joint Disease.**—Jones cites thirty cases of monarticular joint disease of nontuberculous origin, and representing four types: 1. Cases characterized principally by hypertrophy of the joint. 2. Cases characterized by atrophy of the joint. 3. Cases of undoubted joint infection. 4. Cases of probable periarthritis in which infection was uncertain and in which no permanent changes in the joint could be definitely shown. Of the hypertrophic variety there were seven cases, three affecting the spine, two the hip, and one each the knee and elbow. All the patients were men between 35 and 50 years of age, none of them arteriosclerotic. The duration of the disease was from 12 years to a little less than one year. In all but one case the joints involved were those subject to weight bearing. In only one (the elbow) could a definite primary cause (syphilis), be assigned; trauma seemed to bear a definite relation to the disease in only one case. In all save one the disease had been progressing steadily for the worse. The treatment consisted mainly in the use of jackets in the spine cases, coupled with rest in bed several weeks in two on account of sciatica. A spica, a high sole in one of the hip cases, and the use of a cane in another; partial fixation of the knee in a leather support, and the administration of potassium iodid and biniodid of mercury in the case in which the elbow was affected, was the treatment employed in the other cases. This latter case and in one of the spine cases the patients can be said to be well. In three cases (a spine, a hip and a knee) the patients have been relieved, and in two (a spine and a hip), practically no change has taken place. Of the second type there was but one case, occurring in a woman of 36; the disease having existed six years. The left knee was ankylosed in the fully extended position, due to confinement in plaster for two years. Forcible manipulation under anesthesia resulted in a movable joint with about 60 degrees of flexion allowed. There were five cases of type 3. Two of these were cases of spondylitis in young adults, one developing directly after childbirth and coincident uterine infection, and the other occurring in a young man. The first patient recovered in four months after the jacket and brace treatment. The other patient died of typhoid, the spinal affection probably taking its origin in the typhoid. The remaining cases had definite relation to gonorrhea, the joints affected being the hip, knee and ankle. The remaining cases (seventeen in all) belonged to type four. In all, except one, the shoulder was involved; the exceptional case being of the elbow. The affection is an inflammatory disease of the shoulder, characterized by severe pain referred to the anterior part of the joint; the point most painful to pressure being the anterior portion of the head of the humerus. The pain often radiates down the arm or across the scapula. Muscular spasm is pronounced in the early stages, being more severe at night. Final results in these cases were quite satisfactory.

49. **Operative Treatment of Bone Tuberculosis.**—Painter believes that there is a very definite field for radical surgery in tuberculous disease; that this field can be very exactly outlined by certain specific rules to which it is not possible often to make exception; that there would be a great deal less needed of consideration of operative surgery than there is now if cases were properly managed through the earlier stages of the disease; that tuberculosis in the bones and joints is tuberculosis and is not simply joint disease; that the principles which underlie the successful treatment of tuberculosis, pulmonary or otherwise, as certainly underlie the treatment of this disease in the bones and joints as they do anywhere else, and that one who attempts this kind of surgery without being in a position to follow out the treatment other than operative had much better forego the operative measures in the majority of instances and give his patients the benefit of nature's restorative measures. Joints which have suffered from tuberculosis infection in childhood, relapsing in adult life, yield the best results if ankylosis can be secured in a good position. If motion is present, together with deformity, the deformity should be corrected, provided there are as many as twenty-five degrees of motion; if less motion than this, and deformity exists, it should be corrected and ankylosis secured at the same time. If deformity is present with ankylosis, the ankylosis should be left alone, and the deformity overcome. If motion without deformity is present and this motion is less than the above mentioned number of degrees, it is safer to secure ankylosis, as the irritation of so few degrees of motion tends to stir up latent disease. This would be called for, of course, unless there were symptoms of oft-repeated joint strain or active disease.

51. **The X-Ray In Bone Tuberculosis.**—Peckham reports five cases of bone tuberculosis, treated with the *x*-ray, as an auxiliary to other treatment, three times a week. All the cases were suppurative, two of them being considered desperate. One is put down as a failure, although even here there was slight temporary improvement, two were markedly improved, while the two desperate cases were practically saved from amputation, one being a knee, the other an elbow.

Physician and Surgeon, Ann Arbor, Mich.

July.

55 *Experiences in Kidney Surgery and the Utility of Diagnostic Aids. C. H. Chetwood, New York.
56 Ascending Neuritis. W. J. Herdman, Ann Arbor.
57 Psychotherapeutics of Neurasthenia. J. C. Solis, Ann Arbor.

55. **Kidney Surgery and Utility of Diagnostic Aids.**—As the result of careful study of personal cases, and an examination of the literature on the subject, Chetwood concludes as follows: In profuse suppuration of the kidney, or multiple abscess of either kidney, there is a question whether nephrotomy or nephrectomy should be primarily resorted to—a question that can only be properly decided on the merits of each case involved. There is no doubt that a very small remnant of kidney structure may perform a certain amount of renal function; and primary nephrotomy and drainage will often give time to decide this question more satisfactorily; and some patients may sustain a secondary better than a primary nephrectomy. General systemic infection may be considered in indication for both primary and secondary nephrectomy. As to lithiasis: The same rules may be applied in the treatment of the kidney itself as are employed in suppuration with renal calculi. There is no question that nephrotomy is the operation indicated in aseptic lithiasis. As to tuberculosis of the kidney: Even when there is a vesical and pulmonary involvement the only resort of reasonable promise is nephrectomy when the integrity of the opposite kidney is established. Generally speaking, in urogenital tuberculosis, removal of the primary focus, which is frequently in the kidney, is likely to exercise an inhibitory influence on the distal implication—as, for instance, vesical involvement. In subcutaneous injury to the kidney, where there is evidence of a perirenal tumor with hematuria, immediate exploratory incision should be employed and, when possible, suture and tamponade should be resorted to. Where the vessels or ureter have been ruptured and the laceration of the kidney is extensive, or where the injuries are complicated by beginning or progressing suppuration, total nephrectomy may be necessary. Conservative operation is favored by a majority of authors and symptomatic treatment is considered effective in mild cases. A safe rule is to resort to exploratory incision in all doubtful cases and to perform extirpation only when necessary. Above all, too much stress cannot be laid on the importance of the refinement of diagnosis and the advantage of having recourse to the

most improved methods of investigation. The great and progressive reduction of mortality is attributable to diagnostic improvement. Marked differences in mortality between different operators may be explainable by the failure to employ the latest diagnostic resources. Chetwood says that what the compass, the sextant, and the chart are in governing the route of the navigator, so are the microscope, the cystoscope and the *x*-ray in directing the course of the surgeon through the obscure realm of kidney surgery.

Annals of Otology, Rhinology and Laryngology, St. Louis, Mo.

June.

58 Deflections of the Nasal Septum: Critical Review of the Methods of Their Correction by the Window Resection. O. T. Freer, Chicago.
59 The Nose and Its Accessory Sinuses in the American Bear. J. M. Ingersoll, Cleveland, Ohio.
60 Stricture of the Eustachian Tube in Aural Diseases, and Its Treatment. W. S. Bryant, New York.
61 Collodion: Its Use When the Membrana Tympani and Malleal Ligaments are Relaxed. W. S. Bryant, New York.
62 The Cause and Treatment of Hay Fever. W. Dunbar, Hamburg.
63 Serum Treatment of Hay Fever. H. W. Lord, St. Louis.
64 Otitis Media Mucosa. J. E. Sheppard, Brooklyn.
65 Otogenous Infectious Thrombophlebitis Without Fever. G. Alexander.
66 *Submucous Window Resection of the Nasal Septum. G. Killian, Freiburg, Germany.
67 *Submucous Resection of the Nasal Septum, New Technic with the Author's Swivel Knife, Reducing the Average Time of the Operation Several Minutes. W. L. Ballenger, Chicago.

66. **Submucous Window Resection of Nasal Septum.**—Killian describes, in detail, the operation devised by him and first reported in 1899. Two hundred and twenty patients have been operated on by Killian and his assistants according to this method. The submucous resection of the septum can be both temporarily and permanently contraindicated. The latter applies to people of advanced age, unless there are important reasons for interference. Small children are also not good subjects for such an operation as their nasal proportions are small and the narcosis is not so satisfactory. From 12 years on, however, the operation generally can be performed. Various chronic constitutional diseases are contraindications to operation. In pulmonary tuberculosis, one should operate only during the early stages, and then only on well-nourished patients with a good prospect of a standstill or healing of their disease. Killian never operates on patients with temporarily healed nasal lupus, because of the danger of a recurrence and an extension of the process. The operation is temporarily contraindicated on all patients with an acute process in the region of the nose, especially an acute rhinitis. If there exists a decided purulent secretion it is best to put off the operation until there is a marked improvement, unless urgent reasons for operating are present. Patients suffering with tertiary syphilitic lesions in the nose must not be operated on until healing has taken place and a long time has elapsed without recurrence. The essential feature in the technic of the operation is that by means of a long speculum, Killian makes a median space between the two mucous layers of the septum, in which he can operate as easily as in the inside of either nasal cavity. The entrance to this space is the incision which becomes rectangular in shape through the use of the speculum. All the other parts of the operation group themselves about this fundamental idea. The operation is completed in about twenty minutes.

67.—See abstract in THE JOURNAL, August 12, 1903, page 495.

American Journal of Urology, New York.

July.

68 *Clinical and Experimental Studies Concerning the Pathogenesis of Epididymitis Gonorrhoica. M. Oppenheim and O. Low, Vienna.
69 Present-Day Status of Tuberculosis of the Male Genital Organs. E. R. W. Frank, Berlin.
70 Untoward Results of Perineal Prostatectomy. G. S. Whiteside, Portland, Ore.
71 Syringe Versus the Irrigator in Gonorrhea. F. C. Valentine and T. M. Townsend, New York.

68. Pathogenesis of Epididymitis Gonorrhoica.—Summing up the results of their observations and experiments, Oppenheim and Loew find certain peculiarities in the origin of this affection. As causes they found besides violent muscular exertion, mechanical or chemical irritations of the posterior urethra, and ejaculations of semen. In a great number of cases the inflammation does not involve the vas deferens, but localizes itself in the tail of the epididymis, later affecting the other parts of the epididymis and also the vas deferens. The rapidity of the appearance could not be explained, but the experiments and microscopic examination speak against a lymphatic transportation. These properties are explained directly by supposing that the transportation of the process into the epididymis is caused by retroperistalic movement of the vas. Such movement is observed in rabbits, guinea-pigs and man, and it is possible to produce it by all the factors which could cause an epididymitis, such as violent trauma, and irritation of the caput gallinaginis. It is an important factor in every ejaculation. Furthermore, it is possible to produce epididymitis experimentally in rabbits, if cocci are present in the posterior urethra, by this retro-peristaltic movement, quite analogous to human gonorrheal epididymitis. As to the theory of the affection, the authors emphasize that the application of instruments of any kind is contraindicated in acute posterior urethritis, and that every necessary exploration of the prostate must be made with great caution. The patient must refrain from sexual excitement and violent muscular exertion. The more severe the posterior urethritis, the greater the danger. If epididymitis exists on one side, all local treatment of the posterior urethra should be suspended because there is danger of the other epididymis becoming affected. In subacute and chronic posterior urethritis, when gonococci are still present, the use of irritating injections should be avoided.

Wisconsin Medical Journal, Milwaukee.

June.

72 Address of President of State Medical Society of Wisconsin. C. W. Oviatt, Oshkosh.
73 State Society, State University and State Medicine. C. R. Bardeen, Madison.
74 Surgical Treatment of Posterior Malpositions of Uterus. G. A. Carhart, Milwaukee.
75 Meningitis. M. D. Bird, Marinette.
76 *Problem of Tuberculosis. V. C. Vaughan, Ann Arbor, Mich.
76½ *Ectopic Pregnancy. W. C. F. White, Milwaukee.
77 Hemorrhagic Disease of Newly Born. C. Flett, Waterford, Wis.

76.—See abstract in THE JOURNAL, June 24, 1905, page 2003.

76½. **Id.**—June 24, 1905, page 2004.

Detroit Medical Journal.

June.

78 Individual Factor in Hygiene. R. C. Cabot, Boston, and P. K. Brown, San Francisco.
79 Chemistry of Digestion. C. D. Aaron, Detroit.
80 "Inferences" of William Beaumont Concerning Gastric Digestion. H. M. Rich, Detroit.

Surgery, Gynecology and Obstetrics, Chicago.

July.

81 Iodin in Surgery, with Special Reference to Its Use as an Antiseptic. N. Senn, Chicago.
82 New Plan of Procedure in Retrouterine Displacements. E. E. Montgomery, Philadelphia.
83 Short Incisions in Certain Common Operations. W. Van Hook, Chicago.
84 *Postoperative Vomiting. E. Boise, Grand Rapids, Mich.
85 Appendicitis and Pregnancy. J. C. Webster, Chicago.
86 *Sudden Death During or Immediately After the Termination of Pregnancy or Operation on the Pelvic Organs in Women. E. P. Davis, Philadelphia.
87 *Pernicious Vomiting of Pregnancy. J. W. Williams, Baltimore.
88 *Clinical Types of Pregnancy Toxemia. J. C. Edgar, New York.
89 *Appendicitis Complicating Pregnancy. H. C. Coe, New York.
90 Vaginal Cesarean Section: Its Indications, Advantages and Technic. H. D. Fry, Washington, D. C.

84.—See abstract in THE JOURNAL, June 17, 1905, page 1954.

86. **Id.**—June 17, 1905, page 1957.

87. **Id.**—June 17, 1905, page 1956.

88. **Id.**—June 17, 1905, page 1956.

89. **Id.**—June 10, 1905, page 1878.

Medical Fortnightly, St. Louis, Mo.

July 10.

91 Cancer and Its Treatment. W. S. Bainbridge, New York.
92 Relation of Man to Nature (A Study Prompted by Testimonies of the Sepulchres). A. S. Ashmead, New York.
93 Albuminuria. C. E. Cole, Jacksonville, Ill.
94 Warner-Ziemann-Romanowsky Staining Method. L. H. Warner, New York.
95 Anatomic Eponyms. R. S. Gregg, Chicago.

July 25.

96 Case of Raynaud's Disease. W. L. Howard, Baltimore.
97 *American Medical Association: Its Origin, Progress and Purpose. L. S. McMurtry, Louisville, Ky.
98 Relation of Man to Nature. A Study Prompted by "Testimonies of the Sepulchres." (Continued.) A. S. Ashmead, New York.
99 Injuries to the Spinal Column. C. E. Black, Jacksonville, Ill.
100 Anatomic Eponyms. (Continued.) R. S. Gregg, Chicago.

97. Id.—July 15, 1905, page 145.

Virginia Medical Semi-monthly, Richmond.

July 21.

101 Acute and Chronic Gastritis, Diagnosis and Treatment. M. O. Burke, Honaker, Va.
102 When Shall We Use the Forceps? N. H. Reeve, Bristol, Tenn.
103 Physical Therapeutics. J. C. Walton, Chase City, Va.
104 Principles of Surgery. S. McGuire, Richmond, Va.

St. Paul Medical Journal.

July.

105 Colles' Fracture. J. Knott, Dublin, Ireland.
106 Preliminary Discussion of Workingmen's Insurance Against Tuberculosis. H. L. Ulrich, Minneapolis.
107 Extra-Routine Views of Tuberculosis Pulmonalis. R. M. Phelps, Rochester, Minn.
108 Gastric Cancer. J. W. Bell, Minneapolis.
109 Suggestions Concerning the Treatment of Some Common Forms of Nervous Disease. C. E. Riggs, Minneapolis.

Mobile Medical and Surgical Journal.

July.

110 Blood Smears—Their Diagnostic Value. J. B. Guthrie, New Orleans, La.
111 Pancreatic Cyst. C. Wilson, Birmingham, Ala.
112 Hip Joint Complications in Typhoid. M. Pitts, Selma, Ala.
113 Diagnosis and Medical Treatment of Some Forms of Kidney Disease. H. G. Perry, Greensboro, Ala.

New York State Journal of Medicine.

July.

114 Cerebrospinal Meningitis. H. Brooks, New York.
115 Acute Intestinal Intussusception. D. C. Moriarta, Saratoga Springs, New York.
116 Treatment of Acute Otitis Media. C. S. Payne, Liberty, N. Y.
117 Need of Sexual Education. E. L. Keyes, Jr., New York.
118 Dislocation of Foot Backward, Without Fracture of Bones, or Rupture of Ligaments, Which is Irreducible. G. C. Bayley, Poughkeepsie, N. Y.
119 Unilateral and Other Unusual Forms of Nystagmus. A. Duane, New York.
120 Surgical Treatment of Gastric Ulcer. J. F. Erdmann, New York.
121 Selection and Administration of the Anesthetic. J. T. Gwathmey, New York.
122 Dynamics of Female Pelvis, with Special Reference to Malpositions of Uterus and Their Treatment. G. C. Childs, New York.

FOREIGN.

Titles marked with an asterisk (*) are abstracted below. Clinical lectures, single case reports and trials of new drugs and artificial foods are omitted unless of exceptional interest.

British Medical Journal.

August 5.

1. The State and the Profession, Address British Medical Association. J. M. Rhodes.
2 The Professional Relations Between Spa Doctors and Their Brethren. A. Mouillot.
3 *Experimental Contribution to the Treatment of Cholelithiasis. W. Bain.

3. **Cholelithiasis.**—The experiments described by Bain were undertaken to ascertain the changes undergone by gallstones introduced into the normal gall bladder, and the fat of such calculi when cholecystitis was artificially produced. Various substances were also given to dogs with cholecystitis in the hope of finding a remedy. The operative procedures were as follows: After the animal was anesthetized the skin of the abdomen was prepared, and a median incision two or three inches long was made from the xyphoid downward. The gall bladder was drawn forward and held by Spencer Wells forceps. It was then incised, the bile soaked up and the stones inserted. Sutures were applied in the usual way, and in a majority of the experiments the gall bladder was stitched to the abdominal wall; in others it was dropped back into the abdominal cavity. When Bain wished to set up cholecystitis, a culture of the *Bacillus coli communis* in normal saline solution was injected into the gall bladder before the last stitch was inserted. Bain found that gallstones introduced into a normal gall bladder become dissolved within a comparatively short space of time, in about eight or nine weeks. That when a mild degree of cholecystitis is set up gallstones inserted into the gall bladder do not disappear, although there is always a reduction in weight. That the introduction of various drugs does not appear to have any effect in resolving calculi introduced into a gall bladder the mucous membrane of which is inflamed. That during a course of the sulphur water gallstones become disintegrated in cases of cholecystitis experimentally induced. That in the treatment of artificially produced cholelithiasis a preparation containing hexamethylenamin has a pronounced effect in causing dissolution of the calculi. That in regard to the action of barium chlorid further experiments are necessary to determine its rôle in experimentally-produced cholelithiasis.

The Lancet, London.

August 5.

4 Chemical Correlation of the Functions of the Body. E. H. Starling.
5 Carbohydrate Metabolism. F. W. Pavy.
6 *Spa Treatment of Circulatory Disorders. L. Williams.
7. Surgery at Sea: Case of Perforating Duodenal Ulcer; Operation; Recovery. H. W. Bayly.
8 *Behavior of Leucocytes in Malignant Growths. J. B. Farmer, J. E. S. Moore and C. E. Walker.
9 Cerebrospinal Meningitis in Ceylon. A. Castellani.
10 Analysis of 300 Consecutive Gynecologic Laparotomies. A. H. N. Lewers.
11 Case of Blackwater Fever. E. S. Crispin.
12 Two Cases of Acute Hemorrhagic Pancreatitis. H. W. Webber.

6. **Spa Treatment of Circulatory Disorders.**—Williams discusses the therapeutic value of the various European spas, particularly Bad Nauheim. He says that the Nauheim treatment can be obtained elsewhere than at Bad Nauheim and that this spa possesses many unpleasant features and some decided disadvantages. From the points of view of climate and accessibility Nauheim is by no means a place to which a cardiac patient should be advised to go. The treatment by Nauheim baths is quite unsuited to the great majority of cardiac disorders, and its indiscriminate recommendation, even when dilatation is the most prominent objective feature, is by no means free from danger. In deciding on the respective claims of the numerous spas at which cardiovascular diseases may be treated, it is necessary to take into consideration various factors. In general, it may be said, that any spa at which gout is properly treated is, potentially at any rate, a spa suitable to a cardiac lesion. It must be remembered, however, that physicians at such resorts are not, as a rule, in the habit of dealing with cardiac disorders; and, furthermore, that certain health resorts, the waters of which are well adapted to the gouty, have specialized in troubles of the cardiovascular system. To get the best results from spa treatment, patients should be treated in the earliest stages, in the stage of arterial spasm, which has not as yet led to organic change.

8. **Behavior of Leucocytes in Malignant Growths.**—Farmer, Moore and Walker give an account of observations relating to the peculiar behavior of leucocytes in very early examples of carcinoma in various parts of the human body. The phenomena described appeared to be mainly, if not entirely, restricted to cancer in its earliest stages and did not occur in older growths, in metastases, or in grafts introduced into other individuals. In a rectal carcinoma the size of a bean it was found that there was a very distinct zone of transition from the normal to the cancerous element round the periphery of the tumor. Immediately within the outer zone the leucocytic crowding was most strikingly apparent, and in a number of cells it was easy to discern the presence of leucocytes which had invaded the epithelial cells, where they stained readily as an inclusion. This phenomenon did not occur in the adjacent healthy tissue nor in inflammations produced artificially. The most important, as well as the most singular, feature lies in the fact that neither the leucocyte nor the invaded tissue cell appeared to be affected injuriously. In many instances it was found that both the leucocyte and the tissue cell were dividing mitotically at the same time. The authors believe that a mixture of the chromosomes derived from the leucocyte and tissue cell, respectively, is distributed between the daughter nuclei resulting from the mitosis. In this way a complete disturbance of the normal chromosome constituents of the cell will be effected and the distribution must be of a qualitative as well as of a quantitative character. What its relation to the ultimate reduction that

occurs in neoplastic cells may be is a subject for further investigation.

The Practitioner, London.

August.

13 Pathologic Variations of Physiologic Vasomotor Action with Special Reference to the Malarial Paroxysmal Neuroses. F. Hare.
14 *Intestinal Obstruction After Pelvic Operations, Particularly After Supravaginal Hysterectomy. E. M. Corner.
15 Edema of the Feet and Legs Due to the Excessive Ingestion of Sodium Chlorid. J. H. Bryant.
16 Diffuse Carcinoma of the Stomach, Illustrated by Two Extreme Cases. E. W. H. Groves.
17 Hydrocephalus and Posterior Basic Meningitis. O. Hildesheim.
18 Current Theories Regarding the Causation of Arteriosclerosis. J. M. Cowan.
19 Work of the Pancreas. W. L. Brown.

14. **Intestinal Obstruction After Pelvic Operations.**—The object of Corner's paper is to enunciate two propositions: First, the small intestines are only too prone to become adherent to the uterine stump left after supravaginal hysterectomy; and, second, that the reasons for this are to be found in the nature and technic of the operation as it is usually performed. The operation which stands pre-eminent among all others in causing this complication is supravaginal hysterectomy. The presence of the uterine stump among the small intestines undoubtedly disposes them to become adherent. Corner suggests that there are means of obviating these occurrences. The stump should be sealed off quickly and in such a manner that the peritoneal edges do not gape. The best method of suturing a uterine stump consists of deep stitches, with intermediate ones, taking up little more than peritoneum, in between. Stitches must not be tied too tightly, but just sufficiently to sink the thread in a groove in the stump. A long posterior flap is the one which is most useful. It covers the cervical stump of the amputated uterus, a continuous suture fixes it to the bottom of the uterovesical pouch, at the same time anteverting the stump so that it covers and protects the line of stitching from the intestines, preventing them from becoming adherent.

Journal of Tropical Medicine, London.

August 1.

20 Spirillosis in Portuguese, West Africa. A. Y. Massey.
21 The Aborting of Liver Abscess: Plea for Early Punctures. P. N. Gerrard.
22 Administrative Measures Taken Against Malaria and Consumption in the Tropics. R. C. Temple.
23 Equipment and Hygiene on "Shooting Trips." G. A. P. Ross.
24 Impaction of the Bowels with Inflammation and Perityphlitis. G. H. Fink.

Virchow's Archiv, Berlin.

25 (CLXXX, No. 1.) Fatty Infiltration and Fatty Degeneration of Kidney.—Ueber Fett-Infiltration und fettige Degeneration der Niere des Menschen. M. Löhlein.
26 Ueber die Thyroidea von Kretinen und Idioten. S. Getzowa (Berne).
27 Mucous Zone of Epithelium of Stomach and Intestine Before and After Birth.—Schleimzone des menschlichen Magen und Darmepithels vor und nach der Geburt. E. v. d. Leyen (Berlin).
28 Lymphoid Tissue in Mucosa of Male Urethra.—Ueber das Vorkommen lymphoiden Gewebes in der Schleimhaut der männlichen Urethra. Busch.
29 Ueber Gliome der Nebennieren (of suprarenals). H. Küster.
30 Zur Pathogenese der Varicen. W. Kallenberger.
31 Ueber Phlebektasie. G. Scagliosi (Catania).
32 Zur Frage der Entstehung des Chorionepithelioms aus congenitaler Anlage. L. Pick.
33 Aetiologie der primären Nebenhoden-Tuberkulose (of epididymis). E. Hartung.
34 (CLXXX, No. 2.) Zur Kenntnis der Blut-Fermente (of blood). A. Jolles and M. Oppenheim.
35 Experimentelle Untersuchungen über das Adrenalin. B. Wolownik.
36 *Action of Electricity on Stomach Functioning.—Experimentelle Untersuchungen über die Einwirkung der Elektrizität auf die sekretorische Tätigkeit des Magens. R. Freund.
37 Die Sympathischen Ganglien des Magens bei einigen experimentellen und spontanen Magen-Krankheiten. L. d'Amato and P. Macri.
38 Fall von spontaner Herz-Ruptur (of heart). C. Hart.
39 Angioma racemosum und serpentinum des Gehirns (of brain). M. Simmonds.
40 Genese des Adeno-Karzinoms und Karzinoms des Pankreas. S. P. L. Hulst.
41 Die sogen. congenitale Pylorus-Hyperplasie eine Entwicklungs-Störung. Torkel.
42 Deformities in Caudal End of Fetuses.—Abnormitäten am Schwanzende menschlicher Foeten. R. Meyer.
43 Ueber Amyloid-Degeneration and Amyloid-Färbung (staining). Edens.
44 Verfahren zur Erzielung haltbarer Amyloid-Präparate (durable specimens). P. Meyer.
45 Metal Stain for Calcified Tissue.—Ueber Metallfärbung verkalkter Gewebeteile. W. Stoeltzner.
46 (CLXXX, No. 3.) Experimentelle Beiträge zur Aetiologie des primären Verbrennungstodes (death from burning). H. Pfeiffer.
47 Ueber Lymphocyten-Granula. Levaditi.
48 Entstehung der echten, freien Gelenkkörper (origin of free bodies in joints). H. Rimann. Experimental.
49 Ueber das Aneurysma am Stamme der Pulmonal-Arterie. M. Lissauer.
50 Action of Allyl Mustard Oil on Liver and Kidneys.—Wirkung des Allylsenföls auf Leber und Niere. P. Meyer.
51 Tissue Changes in Displaced Testicles, Epididymis and Vas Deferens.—Gewebsveränderungen des verlagerten Hodens, etc. M. Matsuoka.
52 Der primäre Leberkrebs zugleich ein Beitrag zur Histologie des Krebses. H. Oerter (New York).
53 Blut-Gefäss-Endotheliom, entstanden auf dem Boden von Hämorrhoiden. E. Schlesinger.
54 Ueber eine besondere Drüsen-Formation in der Prostata glandular formation). A. Rothschild.
55 Aetiologie der Prostata-Hypertrophie. Id.
56 Ueber einen weiteren Fall von abdomineller Nebenlunge (abdominal accessory lung). A. Seltsam.
56½ Gliome der Nebennieren (of suprarenals). J. Wiesel.

36. **Action of Electricity on Secretion of Gastric Juice.**—In Freund's experiments on three dogs with old Pawlow fistulas electric stimulation of the stomach caused nothing more than the secretion of a scanty, mucous and a more or less strongly alkaline secretion. The stomach glands did not react with the production of gastric juice except with the natural stimulus of food. The electricity alone was unable to induce the specific secretion.

Wiener klinische Wochenschrift.

Last indexed page 600.

57 XVIII, No. 23.) *Anatomic Signs of Antemortem and Postmortem Burns.—Ueber die anatomischen Kennzeichen der vitalen und postmortalen Verbrennung. F. Reuter.
58 Beiträge zur Pathologie der Vulvitis. O. Sachs.
59 Hay Fever and Its Specific Treatment with Pollantin.—Das Heufieber und seine spezifische Behandlung mit Pollantin. A. Heindl.
60 (No. 24.) Der Micrococcus meningitis cerebrospinalis als Erreger von Endokarditis sowie sein Vorkommen in der Nasenhohle Gesunder u. Kranker (presence in nose in health and in disease and as a cause of endocarditis). A. Weichselbaum and A. Ghon.
61 Zur Dynamik der Mitral Insuffizienz. (Dynamics of.) E Schwarz.
62 Differentiation of Semen Albumin.—Beiträge zur Lösung des biologischforensischen Problems der Unterscheidung von Spermaeiweis gegen über den anderen Eiweisarten derselben Spezies durch die Präzipitinmethode. H. Pfeiffer.
63 *Zur operativen Behandlung der habituellen Luxation der Kniescheibe nach Ali Krongius (habitual luxation of patella). R. v. Rüdiger.
64 *(No. 25.) Zur operativen Behandlung des subphrenischen Abszesses. P. Clairmont and E. Ranzi.
65 *Negri Bodies in Rabies.—Zur Kenntnis der Negrischen Körperchen bei der Wutkrankheit. J. Schiffmann.
66 *Negri Bodies in Rabies.—Ueber die feinere Struktur der Negrischen Körper. R. Maresch.
67 Das Aggressin Coli Bakterium mit mitbesonderer Rücksicht auf seine Spezifität. G. Salus.
68 Growth of Hay Bacillus in Animal Body.—Ueber die Wachstumsmöglichkeit des Heubazillus im Tierkorper. E. Weil.
69 Chemistry of the Colloids in Research on Immunity.—Anteil der Kolloidchemie an der Immunitätsforschung. H. Bechold.
70 (No. 26.) Ueber Pellagra sine Pellagra. T. Lupu.
71 Ueber die Agglutinabilität der Kapsel Bakterien. O. Porges.
72 *Weitere Mitteilung uber Rückenmarksanaesthesie (spinal analgesia). J. Preindlsberger.
73 (No. 27.) Ueber primäre maligne Degeneration der zystischen embryoiden Geschwulste der Ovarien (embryonic ovarian tumors). H. Ludwig.
74 Ueber Antihämolysine. M. v. Eisler.
75 Beitrag zur Aetiologie und Behandlung der multiplen Sklerose. G. Nespor.
76 Ueber den Fusohlenreflex und das Babinskische Phänomen bei tausend Kindern der ersten Lebensjahre (plantar reflex and Babinski in children). A. Bickel.

57. **Differentiation of Antemortem and Postmortem Burns.**—Reuter believes that it is impossible to determine by examination of the cadaver whether a burn of the first, second or third degree occurred during life or after death. The viscera should be examined for carbon particles and evidences of carbonic oxid asphyxiation. Serous blebs may form on edematous parts, hence they do not indicate that the burn occurred during life.

63. **Habitual Luxation of Patella.**—Ruediger's patient was a girl 10 years old, who sustained a severe injury of the patella which was followed by a habitual luxation of this bone, the result of improper treatment. The knee joint was very painful and at times became swollen. The patient was operated on according to the method of Ali Krogius, which the author believes to be the ideal operation for this class of cases. The patient made a perfect recovery.

64. **Operative Treatment of Subphrenic Abscesses.**—Clairmont and Ranzi cite ten cases, seven males and three females,

most of whom were between the ages of 20 and 30, in three cases the abscess emptied itself through the appendix. In eight cases the abscess was situated on the right side; in two on the left side. In one case the abscess was situated between the stomach, spleen and colon. All the abscesses were intraperitoneal. Tympanites appeared in five cases. In one case it was caused by the *Bacillus paracoli aerogenes*. In diagnosing this condition the authors found the Roentgen ray of value, particularly in cases showing obscure symptoms. Fluoroscopy was also used successfully. Two of the patients operated on died, one on the eighteenth day from peritonitis. The other case offered little hope of a successful outcome at the time of operation. Seven patients made a complete recovery. Two of the patients were operated on according to the method of Grueneisen. In four cases the abscess was opened by making an incision in the chest wall along the margin of the ribs, without entering the pleura. In the remaining four cases the abscess was evacuated through the lumbar region.

65. **Negri Bodies in Rabies.**—Schiffmann found these bodies in eight rabid dogs and in two men. He divides them into three kinds: 1. Large, irregularly formed bodies containing a large number of sharply-defined ringlike structures. 2. Forms containing only one variety of these internal structures. 3. Forms having a homogeneous structure. He says that it is impossible to state whether these bodies represent parasites or a degeneration of the cell protoplasm. It is just as possible that the Negri bodies are the result of the infection as that they are the cause of rabies.

66. **Id.**—Maresch confirms the work of other investigators and urges further experimentation for the purpose of determining definitely the nature of these so-called cell inclusions.

72. **Spinal Analgesia.**—Preindlsberger cites his experiences in the production of spinal analgesia. He uses a metal syringe, which may be taken apart. It has a capacity of one gram. The injection is made with the patient in Bier's side position. Preindlsberger has operated under spinal analgesia in 345 cases; all but 8 of these have been followed. A complete list is given of all the cases. Only one of his patients suffered from shock and collapse, although 6 others were slightly indisposed.

Centralblatt f. Gynäkologie, Leipsic.

Last indexed page 499.

77 (No. 28, July 15, 1905.) *Schwangerschaft und Carcinoma recti. (Pregnancy and). G. C. Nijhoff.
78 Zur Anatomie des Lateralschnittes (Anatomy of Lateral Incision). J. Tandler.
79 (No. 29, July 22, 1905.) *Die Sectio Caesarea an der Klinik Schauta. J. Neumann.
80 Sectio caesarea conservativa bei Tympania uteri. A. Mueller.
81 Ueber das Hæmatoma vulvæ et vaginæ. H. Walther.
82 (No. 30, July 29, 1905.) Platzen Sauerstofflaschen leicht? (Do ether containers burst easily?) O. v. Herff.
83 *Neues Verfahren zur Entwicklung des abgerissenen, in utero zur fickgehaltenen Kopfes (new method of extracting severed head from the uterus). M. Bensinger.
84 (No. 31.) *Blutuntersuchungen bei Unterleibsleiden der Frauen, besonders bei Uterusmyomen (blood examinations) in women ill with pelvic diseases, especially myoma of uterus). G. Klein.
85 *Zwei Assistenz ersetzende Instrumente (Instruments taking the place of two assistants). C. Rindfleisch.

77. **Pregnancy and Carcinoma Recti.**—A case of carcinoma recti complicating pregnancy, occurring in a woman 18 years old, is reported by Nijhoff. The carcinoma was inoperable. The pregnancy had advanced to the seventh month. At the beginning of the eighth month she developed symptoms of sepsis and died in a few days after the infant had been delivered by forceps. The child was placed in an incubator. Nijhoff refers to 22 published cases. In closing he says that if the child is not viable the operator must choose between induction of labor and waiting until the child is viable. He believes that the former is preferable, inasmuch as it is extremely probable that during the time of waiting an operable tumor may be converted into an inoperable tumor.

79. **Cesarean Section at Schauta's Clinic.**—Neumann reports on 175 cases of Cesarean section in Schauta's clinic during the past twenty years. Of this series 14 patients died, a mortality of 8 per cent. Six of these patients, however, did not die as the result of the operation, but from other causes, thus leaving only 169 cases with 8 deaths, a mortality of 4.7 per cent. As for the babies, 165 were born alive, 9 were born dead and one was asphyxiated during delivery and died one-half hour afterward. In 158 of these cases a contracted pelvis was the indication for operation. In 6 cases there were stenoses of the soft parts; in 3 cases tumors of the adnexa, and in one case a malignant tumor of the pelvis obstructed the outlet. Five cases of eclampsia and 2 of septic endometritis were also indications for operation. In 47 cases the pelvic contraction was absolute. These patients were operated on as follows: Conservative longitudinal incision (including 2 cases of osteomalacia), 27 cases; longitudinal incision with castration (osteomalacia), 1; conservative transverse fundus incision, 1; transverse fundus incision with castration (osteomalacia), 3 cases; transverse fundus incision with resection of tubes, 5 cases; Porro operations, 9 cases; in 7 cases the uterus was opened by longitudinal incision, in 2 by a longitudinal incision over the fundus (two of these cases were not positively aseptic and 7 patients had osteomalacia). In one case of osteomalacia hysterectomy was done after the Cesarean section. In the 111 cases of relative contractions of the pelvis the following procedures were carried out: Ninety conservative longitudinal incisions; 1 conservative longitudinal

Forceps and bandage holder (see abstract 85, page 745).

incision over the fundus; 1 longitudinal incision with resection of the tubes; 12 conservative transverse fundus incisions, and 7 transverse fundus incisions with resection of tubes. Among the operations performed on the 6 patients with stenosis of the soft parts were 2 conservative longitudinal incisions (1 carcinoma cervicis and 1 congenital stricture of the vagina); 1 transverse fundus incision with resection of the tubes (cicatricial stenosis of the vagina); 2 Porro operations with longitudinal incisions (cicatricial stenosis of the vagina), and one Porro operation with transverse fundus incision (carcinoma cervicis). In the 5 cases of eclampsia a Porro operation with longitudinal incision was done once, and the conservative longitudinal incision four times. In the total number of cases the Porro operation was done 15 times, hysterectomy once, and ablation of the adnexa 18 times.

83. **Method of Extracting Severed Head from Uterus.**—The method employed by Bensinger consists in applying a pair of bullet forceps to the cervical vertebræ, and tamponing the uterus and cervix with iodoform gauze, and the vagina with cotton. A piece of string was attached to the forceps, passed

over the foot of the bed and weighed about four pounds—a sort of tension extraction. In the cases reported there was uterine inertia, but the method adopted proved successful, the cervix being dilated sufficiently to allow of the passage of the head.

84. **Blood Examinations in Pelvic Disease.**—Klein emphasizes the value of blood examinations in women as a means of diagnosis and prognosis in cases of pelvic disease, especially in myoma of the uterus, and cites several cases.

85. **New Instruments.**—Rindfleisch has devised two instruments to take the place of assistants, thus permitting the surgeon to do minor gynecologic operations at the patient's home in cases of necessity. One is a forceps and bandage holder (p. 744), consisting of an open metal loop, with the ends turned in, attached to a rod, at the other end of which is a set-screw. The rod is made in two parts so that it can be shortened or lengthened as may be necessary. The forceps are held in place by means of the set-screw, whereas the bandage is held by the loop. The second instrument is a self-retaining speculum patterned after the Sims model, to which a 350 gram weight is attached.

Centralblatt für Chirurgie, Leipsic.

Last indexed page 429.

86 (No. 28, July 15, 1905.) Wie entsteht die Thrombose der Vena iliaca externa links nach der Appendicektomie? Cause of thrombosis of left external iliac vein following appendicectomy. O. Witzel.
87 (No. 29, July 22, 1905.) *Ein Ligaturring (ligature ring). A. Stieda.
88 (No. 30, July 29, 1905.) *Zur Chirurgie der Halsdrüsen (surgery of neck glands). A. Most.
89 Die Halbseitenlage bei Operation der Perityphlitis (semidorsal position in operation for perityphlitis). K. Förstering.
90 (No. 31.) Zur Frage der Osteochondritis dissecans. König.
91 *Eine einzeitige Operation der Hypospadia penis und penoscrotalis mit vorausgehendem Perinealschnitte (single sitting operation for hypospadia penis and penoscrotalis with preliminary perineal section). H. Vulliet.

87. **Ligature Ring.**—Stieda describes a so-called ligature ring devised by v. Bramann. It consists of three parts, a ring provided with an adjustable clutch and carrying a firmly fixed rod on which revolves a metal spool, on which the ligature is wound. Over this ligature spool a perforated metal cap is pushed, completely covering the spool. The end of the ligature passes through one of the perforations in the cap. The ring is placed on a finger of the left hand, thus doing away with useless handling of the ligature. The ring is easily sterilized. Stieda prepares the silk by immersing it in ether for twenty-four hours, and then boiling it for half an hour in a 3 per cent. carbolic acid solution. It is then wound on the spool and boiled again for half an hour in the 3 per cent. carbolic acid solution.

88. **Semidorsal Position in Operation for Perityphlitis.**—Foersterling, Schlange's assistant, speaks of the latter's custom of placing his patients, after having opened the abdomen, in a left semidorsal position, supporting the right shoulder and buttock so that the body lies from 12 to 15 cm. above the table. This position permits of much more rapid operating by keeping the intestines out of the field and thus enabling the operator to find the appendix quite readily. This position is said to possess all the advantages of elevating the pelvis and none of the disadvantages of the latter method.

91. **Operation for Hypospadia Penis and Penoscrotalis.**—Vulliet's method consists of a preliminary perineal incision and a small urethral incision through which an elastic catheter is inserted into the bladder, thus providing for the outflow of the urine. The penile urethra is then repaired, the choice of method being immaterial. After a few days the perineal catheter is removed and the wound allowed to granulate. This method provides for a one-sitting operation—a distinct advantage.

Münchener med. Wochenschrift, Munich.

92 (LII, No. 25, June 20, 1905.) Importance of Lumbar Puncture in Otology.—Die Bedeutung der Lumbalpunktion für die Ohrenheilkunde. C. Grunert.
93 Der Streptokokken Befund bei Variola und Varizellen in Bezug auf ein differential diagnostiches Verfahren. H. De Waele and E. Sugg.
94 Technic of Vaccination of Eye.—Technik des Guarnierischen Impfexperimentes und seine Verwendung zum Nachweis von Vakzine Erregern in den inneren Organen von Impftieren. Th. v. Wasielewski.
95 Origin of Paraurethral Passages in the Male.—Ueber die Herkunft der parauerthalen Gange des Mannes. A. Lichtenberg.
96 Ueber einen neuen Indikator. E. Fuld.
97 Action and Dangers of Injections of Sublimate in Urethra.—Einwirkung der Sublimatinjektionen auf die Schleimhaut der Harnrohre und ihre Gefahren. P. Asch.
98 Das Antitussin in der Behandlung des Keuchhustens (antitussin in treatment of whooping cough). R. Rahner.
99 Medical Reports from Seat of War.—Aus militärärztlichen Berichten vom Kriegsschauplatz im Fernen Osten. v. Pezold.
100 "Apparat zur Gefrierpunktsbestimmung" (apparatus for determination of freezing point). F. Schlagintweit.
101 Hot Water and Alcohol Disinfection in Obstetrics.—Die Heisswasser Alkoholdesinfektion nach Ahlfeld auf der geburtshilflichen Abteilung des Frauenspitals Basel-Stadt. O. v. Herff. (Commenced in No. 24.)
102 Can a Cure Be Patented?—Ist ein Heilverfahren patentfähig? R. Freund.
103 (No. 26.) Die Körnelungen der Lymphozyten des Blutes (granulation of leucocytes). H. Schridde.
104 *Fatigue Toxin and Antitoxin.—Ueber des Ermüdungstoxin und dessen Antitoxin. W. Weichardt.
105 Zur Theorie der biologischen Strahlenwirkung (action of rays). J. Schlachta.
106 Zur Kenntnis der metaplastischen Knonchenbildung in lymphatischen Apparaten (metaplastic bone formation in lymph tissues). H. Merkel.
107 Treatment of Cryptorchism.—Die Behandlung des Kryptorchismus. A. Schäfer.
108 *Intubation mit Zelluloid Tuben. P. Reich.
109 Die Behandlung der Struma mit Röntgen Strahlen. R. Stegmann.
110 Die Abkürzung der Nachbehandlung akuter Mastoidusoperationen durch Paraffin Füllung (use of paraffin to shorten after-treatment of mastoid operations). E. Schatz.
111 Zur Lehre von der Entstehung der Uterus Blutungen (origin of uterine hemorrhages). A. Theilhaber.
112 (No. 27.) Spirochaete pallida (Schaudinn) und Syphilis. B. Kiolemenoglou and F. v. Cube.
113 Chemical Individuality of Embryonal Cells.—Ueber die chemische Individualität der Embryonalzellen. R. Rossle.
114 Ein Beitrag zur Lehre von den Beschäftigungsparesen (occupation pareses). A. Bittorf.
115 Ist Lysoform giftig (is lysoform toxic)? T. Weylin.
116 Etwas über die Jahresbeule (oriental sore). J. P. Naab.
117 Gaseous Organs in Typhoid.—Schaumorgane bei einem Typhuskranken. F. Reiche.
117½ Ueber Leuchterscheinungen beim Reiben evakuierter Rohren (luminous tubes). R. Furstenau.
118 Bemerkungen uber die "Angine a bacillus fusiformes." H. Vincent.
119 Klinischer Beitrage zur Bronchoskopie. H. v. Schrotte. (Commenced in No. 26.)
120 Ueber Urin und Urin Sedimente bei chronischen und lokalen Stauungen, in Endzustanden und im Kollaps (in congestions, etc.). C. Klieneberger. (Commenced in No. 28.)
121 Case of Extrauterine Pregnancy at Term, with Membranous Malformations of Fetus.—Ein Fall von aus getragener Extrauterngravidität, verlumden mit Zahlreichen Weissbildung en der Frucht. G. Wiener.
122 (No. 28.) Aetiologie der Syphilis. J. Siegel.
123 Zur Physiologie und Pathologie der Bauchdeckenreflexe (reflexes of abdominal walls). E. Muller and W. Seidelmann.
124 Avoidance of Irritation of Kidney After Large Doses of Salicylates.—Die Vermeidung der Nierenreizung nach grossen Salizylgaben. E. Frey.
125 Experiences with the Gruber-Widal Test.—Erfahrungen mit der Gruber-Widalschen Reaktion bei Berücksichtigung der Mitagglutination von Paratyphusbazillen. P. Manteufel.
126 Tuberkulose und Schwangerschaft (pregnancy). F. Reiche.
127 Eine Masern Epidemie (2,881 cases of measles). Heissler.
128 What Do We Learn from the Latest Bavarian Blindness Statistics?—Was lehrt uns die neueste bäyerische Blindenstatistik? F. Salzer.
129 Kritische Bemerkungen zur Spirochaete pallida bei Syphilis. C. Thesing.
130 Simplified Butyrometric Test of Stomach Functioning.—Vereinfachung de butyrometrischen Untersuchungsmethode des Magens und die Verwendbarkeit derselben für den praktischen Arzt. Sahli (Berne). (Commenced in No. 27.)
131 Children's Asylums.—Weiteres von deutschen Landerziehungsheimen. O. Katz.

104. **Fatigue Toxin and Antitoxin.**—Through a series of experiments Weichardt found that fatigue toxin is formed in large quantities from muscle albumin by continuous action of the muscles in an atmosphere containing a lessened amount of oxygen. The amount of fatigue toxin is increased by treating it with reducing substances, such as sodium sulphate. Toxins which reduce albumin may also be formed from the placenta, the brain, etc. The antitoxin obtained by repeated injection of fatigue toxin forms a group reaction with these albumin-reducing toxins. Animals injected with both the toxin and the antitoxin are capable of greater resistance to fatigue than animals not so injected.

108. **Celluloid Intubation Tubes.**—Reich has made use of celluloid tubes for intubation purposes. They are light in weight, present a perfectly smooth exterior and interior, are elastic, less likely to produce pressure necrosis, and permit of a large lumen with the thinnest possible wall consistent with strength and firmness. They are disinfected readily by washing in running water and immersion, for a short time, in a weak carbolic acid solution.

Gazzetta degli Ospedali, Milan.

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132 (XXVI, No. 73.) Typhoid Plus Scarlet Fever.—Ileotifo con scarlattine. Allaria.
133 *X-Ray Treatment of Hypertrophied Prostate.—La cura della ipertrofia della prostata coi raggi X. C. Carabelli and C. Luraschi.
134 Morbo di Ménière probabilmente da infezione malarica. G. Spadacci.
135 Oil Extracts in Organotherapy.—Sull'opoterapia a base dei nuovi estaratti oleosi "sofos." L. De Rossi (Genoa).
136 Success of Diphtheria Antitoxin in 2 Cases of Erysipelas.—Il siero di Behring nella erispela della faccia. S. Tomaselli.
137 The Blister.—Il vesicante nella moderna terapia. E. Gugnoni.
138 Convulsions from Helminths.—Pseudo-epilessia da ascardi e la teoria della loro tossicita. S. Radaeli.
139 (No. 76.) Caso di ascite filante con richerche su la reazione degli essudati verso l'acido acetico (acetic test of effusions). E. Pesci.
140 L'anestesia cocaino adrenalinica in chirurgia generale. B. Gennaro.
141 Ascessi traumatici dei lobi frontali (abscess in frontal lobe). E. De Franceschi.
142 Osservazioni culturali sul bacillo della morva (of glanders). A. M. Coco.
143 (No. 79.) *Return of Function in Hydronephrotic Kidney.—Ritorno della funzione nel rene idronefrotico. E. Maragliano.
144 Ataxia and Vertigo in Cerebral-extracerebral Lesions.—Le zone generatrici del fenomeno atassico vertiginoso. S. Mircoli.

133. **Roentgen Treatment of Hypertrophied Prostate.**—Carabelli and Luraschi state that the experiments related in this article were commenced in May and continued through August of 1904, and that they have waited a full year before reporting them in order to ascertain the remote results. No communications in regard to Roentgen treatment of hypertrophied prostate had been published when they undertook it in two cases. The patients were 60 and 65 years of age respectively. They were placed on a sloping table, the surrounding parts carefully protected and the Roentgen rays applied to the perineum, with the tube from 20 to 25 cm. from the skin. Carabelli did not think it necessary to introduce the tube into the rectum as the atrophying action of the Roentgen rays on deep-laying glands like the ovary, spleen and lymphatics has been amply established. It is evident also that the action of the rays on the prostate is more pronounced when the hypertrophy is in the first stage, before the gland has undergone fibrous degeneration. The relief of the pains was marked from the very first. In one case the paresthesia and oppression in the perineum were accompanied by difficulty in urinating and palpation revealed moderate hypertrophy of the prostate. The rays were applied fifteen times, at first two or three times a week and then once a fortnight. The sensory symptoms vanished and urination became very much easier. In the second case the prostate was much enlarged and hard, and there were about 200 gm. of residual urine and evidences of chronic catarrh of the bladder. After six applications of the Roentgen rays the urine became clearer, the pains had subsided, urination was much easier and the residual urine was only 40 gm. After the tenth application there were only 10 c.c. of residual urine, and the patient was dismissed as practically cured. The current was applied for from three to seven minutes at a sitting in the first, and for ten minutes in the second, the current 1.5 amperes, 100 volts. The patients have been examined during the year and recently and the improvement has been found to be permanent.

143. **Return of Function in Hydronephrotic Kidney.**—Bozzi has been conducting considerable experimental research on this subject and is convinced that surgical intervention should be early in case of hydronephrosis, even if the symptoms are not disturbing. It will forestall the development of permanent changes in the tissues of the kidney which otherwise become irreparable. It will also prevent possible infection of the kidney by way of the blood. He cites some suggestive cases to show the importance of these points. In some the cystoscope and catheterization of the ureters showed limpid urine from one kidney and purulent from the other. The kidney with the purulent process was extirpated under the conviction that its mate was sound, but anuria and death soon followed. The hydronephrotic kidney after a conservative operation gradually regains its functional capacity, the extent of restitution being in inverse proportion to the duration of the process. Bozzi's experiences have shown that the microscope discloses much better functional conditions than would be supposed from the macroscopic appearance. Consequently there is every reason to retain the hydronephrotic kidney by a conservative operation.

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145 (No. 2680, April 22, 1905.) El Masaje y la Gimnasia Medica en las Afecciones Traumatica de las Articulaciones. Tripels-Dentzkof.
146 *Pelvi-Peritonitis. D. P. Lizcano.
147 (No. 2681.) El somnoformo. M. Bontheller.
148 Luchemos Contra la Tuberculosis. J. L. de Rego.
149 *Un Caso Clinico de Chancro Palpebral Sifilitico. G. Leoz.
150 *(No. 2682.) Cooperacion al Estudio de la Reparacion Plastica del carrillo (Meloplastia). D. J. Goyanes.
151 Sobre el Diagnostico de los Soplos de la Punta. V. Montenegro.

146. **Pelvic Peritonitis.**—In this article Lizano calls attention to the often forgotten fact that in the beginning of pelvic peritonitis vaginal examination reveals little or nothing beyond a greatly increased sensibility to pain, and that at this stage of the disease the diagnosis must be made from the abdominal symptoms and from the general condition of the patient. After three or four days, he states, when the nausea and vomiting have to a certain extent subsided, careful bimanual palpation reveals the presence of an exudate filling the cul-de-sac of Douglas and occasionally projecting into the vagina. Lizano states that in some cases careful palpation will enable the physician to make out the upper border of the exudate in the hypogastric region and sometimes a zone of induration. Occasionally instead of fluctuation a solid mass will be felt. When the lesion is very extensive the uterus may be fixed in the pelvis by a mass of plastic exudate causing pain on pressure and obstructing the rectum at the level of the uterosacral ligaments. The progress of the disease varies according to the nature and intensity of the infection. In peritonitis following the puerperium or pyosalpinx, the inflammation is generally circumscribed and confined to the pelvis, and the exudate is usually walled off by adhesions. Should the abdominal peritoneum become involved, however, the constitutional symptoms—vomiting, meteorism, etc.—are aggravated. In purulent peritonitis Lizano advises evacuating the pus through the vagina. If evacuation is complete, he says, cure is possible, but if it is incomplete, fistulas of various kinds may result, with death later from septicemia. Lizano discusses the points of differential diagnosis between acute and chronic peritonitis, hematocele, and the gonorrheal and tuberculous forms of peritonitis.

149. **Palpebral Chancre.**—A young woman, aged 29, consulted Leoz for the relief of a tumor of the eyelid. The tumor was round, hard and indurated, and though the patient presented no other symptoms of the disease, a diagnosis of syphilis was made. This diagnosis was confirmed later by a colleague in a general hospital. Leoz reports this case because of the extreme rarity of chancre in this region and the likelihood of mistaking it for a chalazion or even for a simple blepharitis. In 25,000 cases of eye diseases Leoz has only seen two like this and one chancre of the conjunctiva.

150. **Plastic Operations on the Cheek.**—Goyanes states that the most frequent causes of loss of tissue in the cheek are trauma, gangrene, and operations for the removal of carcinoma. He says that unless this loss is corrected by surgical means there is likely to be considerable resulting deformity, which generally takes the form of cicatricial contraction of the muscles of the lower jaw. In this article he reports the case of a patient aged 22, who entered the clinic of D. A. San Martin in May, 1904. According to the patient's statement, he had had a malignant pustule on the inside of the left cheek at the age of 7, which was treated with the Paquelin cautery. The resulting contraction of the muscles prevented him closing his mouth. The patient was anesthetized and a flap was formed of the skin of the neck. This flap was inverted and turned toward the buccal cavity and sutured in place with catgut. The cosmetic effect was very good and the patient was able to close his mouth and to masticate his food. Goyanes describes the operation in detail and reviews the literature on the subject. Goyanes describes the operation in detail, emphasizing the necessity for avoiding wounding Steno's duct. He also reviews the literature on the subject.